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1
xii
1



FIG. 3.

CASE No. 5.—Exstirpation of the lacrymal sac and gland, left inside, March 17, 1896. Photographed on the sixth day after the operation. No subconjunctival hemorrhage.

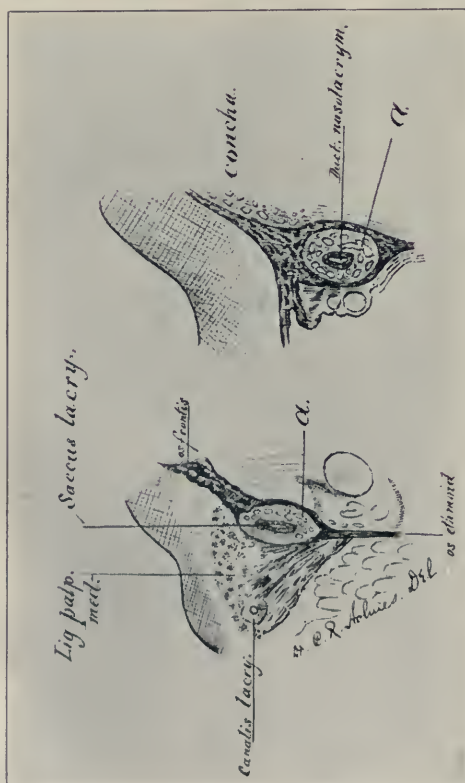


FIG. 1.

Horizontal section through lacrymal sac.
From Merkel's *Anatomic*.

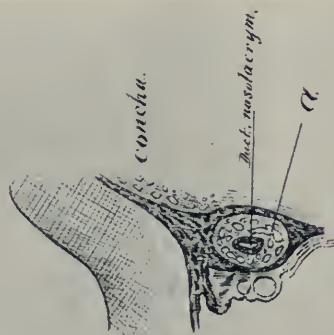


FIG. 2.

Horizontal section through lacrymal duct (bony canal). From Merkel's *Anatomie*.

a.—Venous plexus in submucosa.

2
1

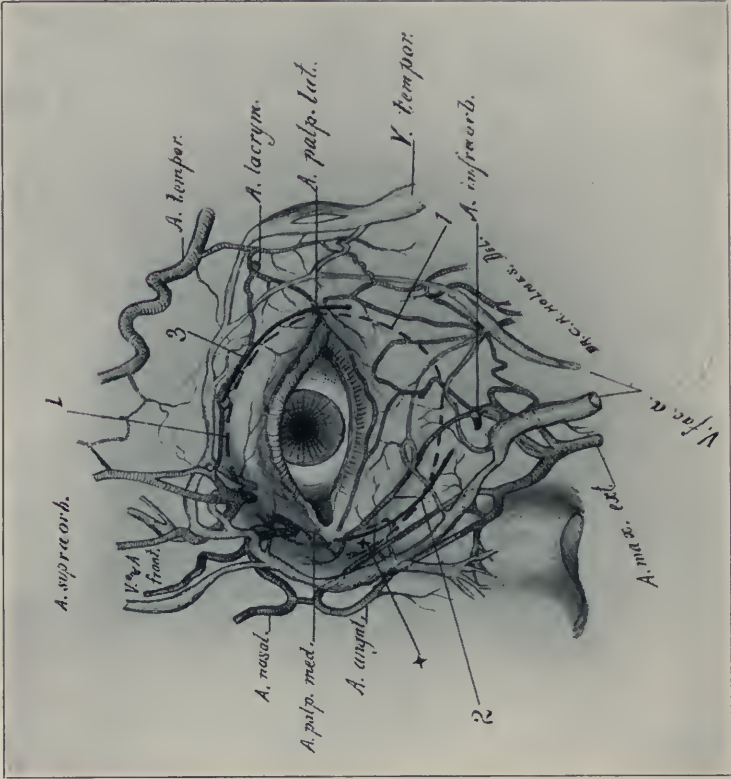


FIG. 5.

Facial arteries and veins surrounding the eye. Modified from Merkel's *Anatomic*.
1.—Outline of bony orbital margin.
2.—Incision for the removal of lacrymal sac.
3.—Incision for the removal of lacrymal gland.
+ Fossa sacci lacrym.



FIG. 4.

CASE No. 9.—Extirpation of sac and gland. Photograph taken on the sixth day after operation. Line of incision in part seen below the brow. Subconjunctival hemorrhage marked.

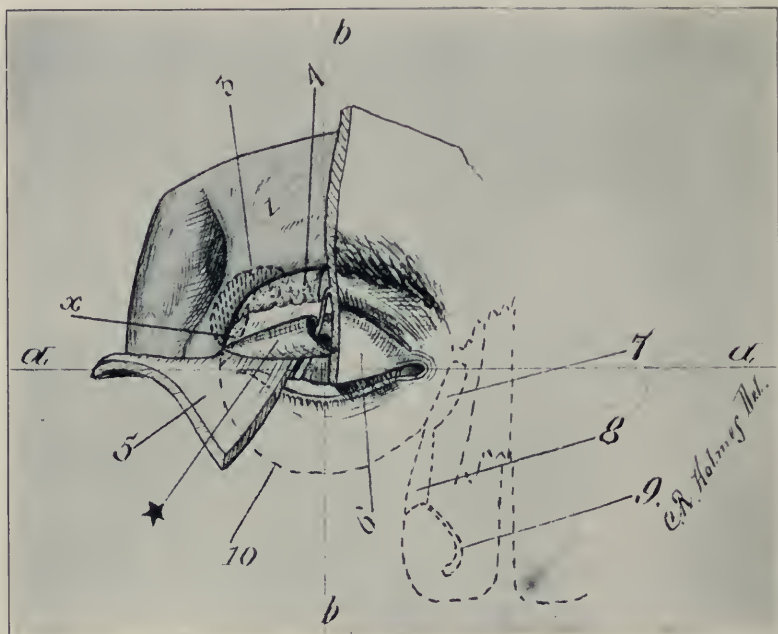


FIG. 6.

1.—Frontal bone. 3.—Superior lacrimal gland. x.—Inferior lacrimal gland. 4.—Orbital fat. 5.—Flap of soft tissue from brow. *—Septum orbitale, dissected from orbital margin and reflected downwards, exposing the orbital fat (of which a triangular mass often passes outwards and downwards in front of the gland) in most cases the anterior edge of the gland lies 2 mm upwards and backwards under the orbital margin.

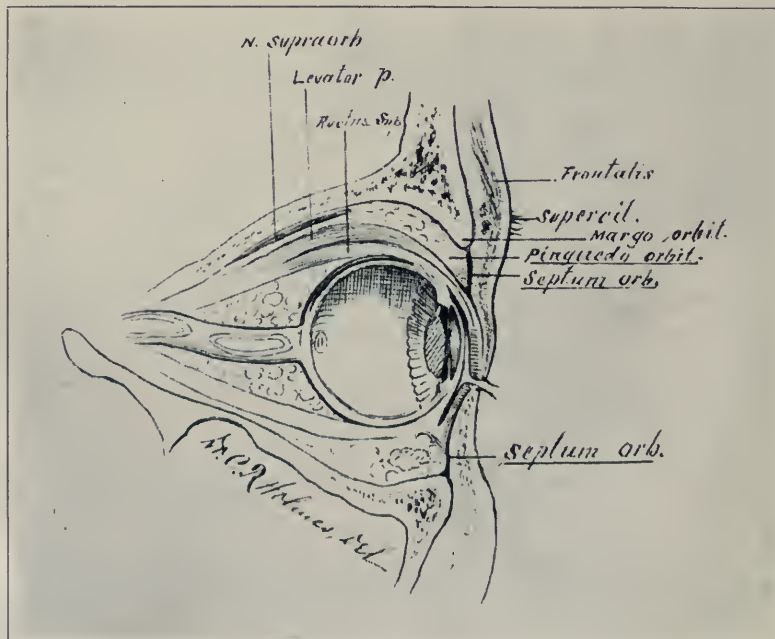


FIG. 7.

Perpendicular section through centre of cornea and optic foramen.
Slightly modified from Merkel.



FIG. 9.

JOHN SEYLER—CASE I.—Double extirpation of both sacs and glands in 1891. Photographed April 20, 1898.

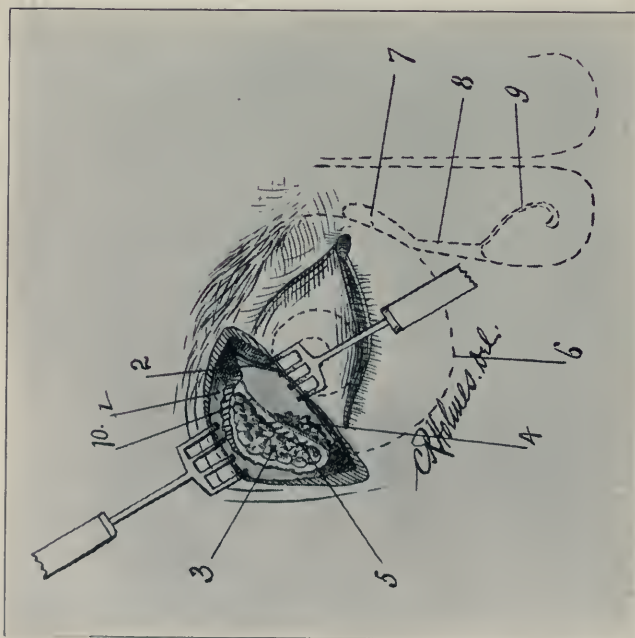


FIG. 8.

Partly diagrammatic.

1.—Bony margin of orbit, partly removed to expose the gland. 2.—Septum orbitale.¹ 3.—Superior lacrymal gland. 4.—Inferior lacrymal gland. 5.—Ducts from lacrymal gland. 6.—Dotted line showing margin of bony orbit. 7.—Fossa of lacrymal sac. 8.—Lacrymal duct. 9.—Inferior turbinate. 10.—Fascia separating the superior and inferior glands (diagrammatic).

¹ Syn. *a.* Fascia palpebralis. *b.* Lig. palpebr. *c.* Fascia tarso-orbitalis. *d.* Lig. tarsi.

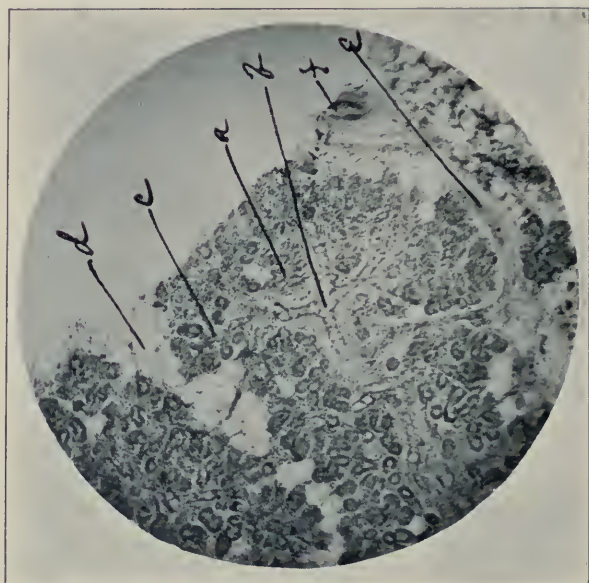


FIG. 12.

Lacrimal gland (from Case 8). (Magnified 130 times.)
a.—Single lobule. *b.*—A central duct around which the entire lobule is formed by branching ducts. *c.*—A terminal duct with acini clustered about it. *d.*—Fat. *e.*—Connective tissue. *f.*—Artery.

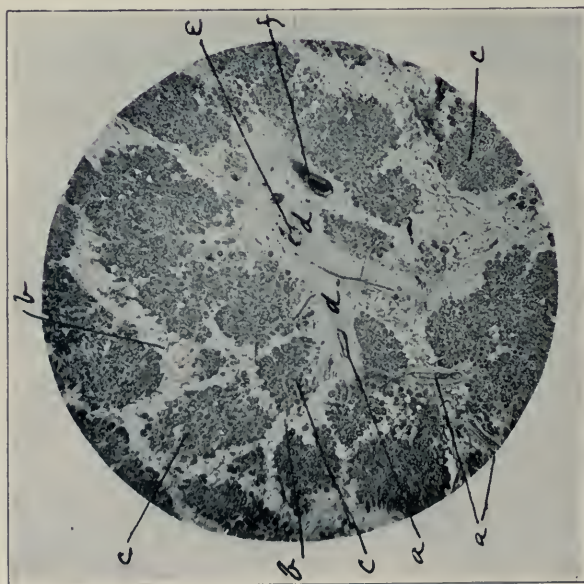


FIG. 11.

Lacrimal gland (from Case 8). (Magnified 40 times.)
a.—Gland duct. *b.*—Fat surrounding lobules. *c.*—Lobules of gland. *d.*—Connective tissue bearing ducts and vessels. *e.*—Vein. *f.*—Artery.

ARCHIVES OF OPHTHALMOLOGY.

EXTIRPATION OF THE LACRYMAL SAC AND GLAND.¹

BY DR. C. R. HOLMES, CINCINNATI, O.

(With 12 illustrations of cases and dissections. Also reports of 17 operations.)

ALTHOUGH advocating the extirpation of the lacrymal sac and gland in suitable cases, I am a firm believer in conservative surgery, so long as milder means will accomplish the desired object, to-wit: permanent cure of the affection within a reasonable time, and without subjecting the patient to prolonged and unnecessary suffering. I also believe that in the beginning of tear-sac affection, our first duty is *not* at once to slit the canaliculi and begin probing, lacerating or bruising a delicate and inflamed membrane, but that we should first thoroughly carry out antiphlogistic treatment in connection with careful attention to the nose and accessory cavities, which may embrace surgical measures, massage as advocated by Königshöfer, and cleansing of the sac by gentle syringing with mild astringents. And if, after this, it becomes necessary to probe, let us proceed gently; any one can make a false passage if enough strength is used. If, however, after careful and prolonged treatment, no permanent relief is obtained, then I believe that we are justified in an operation which will safely, quickly, and permanently, relieve the patient of an annoying epiphora, generally associated with painful recurrent inflammatory attacks of purulent dacryocystitis, which is always a menace to the safety of the eye should an avenue for the infection be created

¹ Read before the Section on Ophthalmology, at the Forty-ninth Annual Meeting of the American Medical Association, held at Denver, Col., June 7-10, 1898.

either by accidental injury of the cornea, or by a necessity arising for surgical treatment of the eye.

The destruction of the tear sac by caustics dates back to the earliest history of surgery, but NANNONI—*Dissertationi Chirurgiche*, Parigi, 1748—was the first to describe it as a special operation, which appears to have been resorted to only in extreme cases. With the advent of aseptic surgery, the slow and painful method of cure by caustic or cautery should be abandoned in favor of the total removal of the sac, with closure of the wound, and healing, as a rule, by primary union.

The extirpation of the lacrimal gland *when diseased*, also dates back to the early days of surgery, and the removal of the healthy gland was even advised by PAUL BERNARD fifty years ago for the relief of tearing, where the canal was hopelessly obliterated.

H. HAYNES WALTON, Surgeon to the Central London Ophthalmic Hospital, wrote in 1853: "Extirpation of a healthy *lacrimal gland* may be required when the natural channels that convey away the tears are lost."

LAWRENCE advocated and practised the extirpation of the *lacrimal gland* in 1867.

BERLIN, in *Klin. Monatsbl.*, 1868, reported a number of cases of extirpation of the *lacrimal sac*, which, however, attracted but little attention.

SCHREIBER reported in *Graefe's Archives of Ophthalmology*, vol. xxvii., 1881, forty cases of extirpation of the *lacrimal sac*, by Prof. Graefe in Halle, with excellent results in most of the cases.

S. C. AYRES reported one case of extirpation of the *lacrimal sac*, *Amer. Jour. of Ophthalm.*, 1885.

DARRIER, in *Gaz. méd. de Paris*, 1886, recommends extirpation of the *lacrimal gland* in cases in which epiphora cannot be checked, or in which the permeability of the sac cannot be restored.

WECKER, in 1889, reported the extirpation of the *palpebral gland* in twenty-five cases.

R. BERLIN, in *Corresp.-Bl. d. Alg. Mecklenb. Ärzte-Vereins*, 1890, reported upon extirpation of the *lacrimal sac*.

KUHNT reported upon the extirpation of the *tear sac* in the Ophthalmological Society of Heidelberg, 1891.

L. MÜLLER, in *Klin. Monatsbl. f. Augenheilkunde*, 1893, reports twelve cases of extirpation of *lacrymal sac*, from Prof. Fuchs's clinic.

TRUE, in *Arch. d'Ophth.*, xiii., 1893, writes on cases of extirpation of the *orbital or palpebral lacrymal gland* in simple and obstinate lacrymation.

TERSON, *Arch. d'Ophth.*, xiii., 1893. On the extirpation of the *palpebral lacrymal gland*.

DEUTE, *Boll. d. Poliambulanza Ann.*, 1893. The rapid treatment of dacryocystitis.

OHLSTRÖM, *Eiva*, No. 16, 1894. On extirpation of the *lacrymal sac*.

REHR, Inaug. Dissert., Kiel, 1895, reports, from the Kieler clinic, 186 cases of *extirpation of the sac* performed since 1889 for dacryocystitis, with uniformly good results.

GUSTAF OHLSTRÖM, *Centralblatt für Augenheilkunde*, 1897. A new instrument to facilitate the extirpation of the *lacrymal sac*.

Dr. HOFFMAN, Transactions of the Twenty-fifth Ophthalmological Congress, Heidelberg, 1896. An operation for the extirpation of the *lacrymal sac*.

SCHIMANOWSKY, *Wjest. Ophth.*, xiii., 4-5, 1897. He recommends the extirpation of the *tear sac* in all obstinate cases of dacryocystitis.

TERSON, *Arch. d'Ophth.*, xvii., 1898. Comparison between different cases of extirpation of the *palpebral lacrymal gland*.

Our modern text-books give but scant attention to the subject under discussion.

JULER, in his edition of 1893, states that he has never obliterated the lacrymal sac, and the removal of the lacrymal gland he speaks of only in connection with tumors.

SCHMIDT-RIMPLER, in his text-book, mentions that the lacrymal gland may require extirpation on account of malignant growths, and furthermore states: "Also for the relief of incurable epiphora has the extirpation of the healthy gland been performed by Lawrence (1867), and

lately the removal of the orbital portion from without, through an opening in the skin, has been recommended."

FUCHS, in his latest edition (1898), speaks of the extirpation or destruction by caustics of the lacrymal sac, but refers only casually to the removal of the gland after stating that the moisture of the globe does not entirely depend upon the lacrymal gland, but that the conjunctival as well as the Krause-Waldeyer mucous glands participate in keeping the eyeball moist.

ELY D. NOYES speaks only of destruction of the sac by caustics or cauteries, and under the heading of "Tear Gland" he states: "The gland may be the seat of neoplasms, such as sarcoma and other tumors, and of cystoid degeneration, and is liable to chronic hypertrophy; but these conditions need no special consideration. *Its extirpation to cure epiphora was practised by Lawrence, but is not now approved.*"

From the foregoing we observe that the operation upon the sac has, although very slowly, gained adherents; but that the removal of the lacrymal gland was practically abandoned. The operations upon the gland reported by DeWecker and Terson were limited to that irregular aggregation of small nodules of gland tissue found under the upper lid, very variable in size, and called the secondary gland, which (or as much of it as can be found) can be removed under cocaine anæsthesia; the patient being directed to roll the eye downward and inward, when eversion of the upper lid will in some, but not all cases, bring into prominence* the palpebral portion of the gland, which appears as a small irregular swelling. To me it appears more rational to remove the gland, which supplies perhaps 90 per cent. of the tears, leaving, if desired, the secondary gland to furnish a small quantity of fluid to dilute the mucous secretion, although even this is not necessary for the comfort of the eye under ordinary circumstances.

The reason for abandoning the removal of the orbital gland is no doubt attributed to failures, and one can readily understand how, before the days of aseptic surgery, there was much danger accompanying an operation which freely

invades the tissues of the orbital cavity; for if an inflammation should develop in such a wound as is produced by the extirpation of the gland, it would be very likely to lead to orbital cellulitis, with strangulation of the optic nerve and vessels, and loss of vision if not of the globe.

I believe we may safely state that, with strict attention to asepsis, the dangers from infection can now be entirely eliminated, and the results, both immediate and remote, are so highly satisfactory that I can see no reason why the operation should not be resorted to in all suitable cases.

I consider the **indications for the removal of the tear sac and gland** to be :

1st. In cases where it becomes necessary to operate upon the globe, as for cataract or glaucoma, especially so, should there not be sufficient time to carry out other methods of treatment.

2d. In patients who cannot devote the time, or who may be unable to endure the treatment by probing.

3d. *In all cases where conservative treatment has failed to cure within a reasonable time.*

An operation which only obliterates the canal without cutting off the annoying supply of tears which torments the patient for the rest of his life, is to my mind *a very incomplete piece of surgery.*

While epiphora in a small percentage of cases does result from displacement of the puncta either through injury, senile changes, or chronic inflammation of the lids, the affection in most cases is due to an inflammation of the sac. It is possible that a few of these cases result from infection carried from the conjunctival sac, but as a rule we must look upon the inflammation as an extension from the nose through the bony canal, with dilatation of the dense venous plexus which exists between the mucous membrane and the bony wall (see Figs. 1 and 2), which, under irritation, becomes engorged similarly to the erectile tissue of the inferior turbinated. The retention of the tears in a sac already infected by the inflammatory process from the nose, forms an ideal place for bacterial development and resulting inflammation, which, if not relieved, passes through the various grades of inflamma-

tory changes from a slight catarrh to a pyogenic condition, with or without involvement of the surrounding structures. It must not be forgotten that we encounter cases with swelling and tenderness over the sac which are entirely pericystic, a condition which may be due to an extension from an empyema of the antrum of Highmore or the ethmoid cells; the thickness of the bone in the immediate neighborhood of the sac often being papyraceous (as was demonstrated in the specimens presented), and there may be dehiscence.

In this connection I may call attention to the fact that some of the cases of suppuration of the lacrymal gland reported by the older authors no doubt were cases where pus had passed from one of the affected accessory cavities or even cranium into the orbit; pus from this source most frequently points at the inner canthus, but may also point over the region of the lacrymal gland. I have the records of three such cases. (See author's article, "The Sphenoid Cavity and its Relation to the Eye," *ARCHIVES OF OPHTH.*, vol. xxv., No. 4.) Pus may enter the orbit from any one of the accessory cavities, even from the sphenoid, but the frontal sinus and ethmoid cells are the most frequent sources.

OPERATION AND TECHNIQUE.

I do not consider the extirpation of the lacrymal sac and gland an easy operation, if performed in such manner that we shall have primary union of each wound and no injury of adjacent parts. This is especially true of the sac.

Where the condition of the tear sac permits of it, I wash it out thoroughly (and also the nose) when the patient is being prepared for the operation, in order to eliminate as much of the infected matter as possible from the field of operation. The administration of an anæsthetic is absolutely necessary for the perfect performance of the operation, and everything pertaining to it must be carried out according to the latest rules of aseptic surgery. The patient's hair (which has previously been shampooed) should be enveloped in a moist towel. A strip of gauze is packed firmly up under the inferior turbinated over the exit of the

canal, to prevent the blood from passing into the patient's pharynx. The seat of operation is thoroughly cleansed, and to guard against reinfection the region of the tear gland is covered with borated vaseline and a pad of gauze held in place by two or three strips of rubber plaster, thus leaving the extirpation of the gland for the last, and thereby minimizing the danger from infection.

EXTIRPATION OF THE SAC AND CANALS.

In extirpating the sac, I do not think it best to open it if this can be avoided, but first try to hull it out as we would a cyst without rupturing. In order to more clearly outline the sac, I have in a few cases injected with a syringe through the slit canaliculi a thick starch, quite warm, and colored with iodine; then carefully withdraw the syringe, and close the canaliculi with small hæmostatic forceps. This may not succeed in all cases, for the starch under pressure will, if the duct is open, escape into the nose, or under manipulation in dissecting it escapes by the canaliculi. I hope to have a substance which can be injected say at 105° F., and rapidly cooled to body temperature by placing ice over the sac, at which temperature it should be of such consistency as not to escape by a small opening, and, if any escaped into the surrounding tissue through a rupture in the sac, it would not act as an irritant, but be absorbed.

By observing Fig. 3 we notice that, in order to avoid the arteries, we cut along the line indicated, which also corresponds with the centre of the membranous portion of sac. We also cut parallel with the muscular fibres of the orbicularis palpebrarum. By placing the point of the left index finger on the lower border of the bony orbit, one can readily trace the ridge extending upwards along the outer edge of the lacrymal groove in which the sac is imbedded (Fig. 10), until the tendo oculi is reached. We remember that the fundus of the sac rises to the *upper edge of, or slightly above, the tendo oculi*. Place the point of the knife at the centre of the lower border of the tendo oculi. The direction of the knife should not be directly antero-posteriorly, but should point

in the direction of the posterior pole of the globe of the opposite eye. We should carefully dissect through the skin and underlying tissue till the sac is exposed, which, as a rule, one can recognize readily, especially if injected, distended by secretions, or if the canal admits of passing a lacrymal probe. The lips of the wound must be held widely apart by small three- or four-pronged retractors, the field of operation cleared of hemorrhage, and then comes the difficult task of shelling the sac out of the lacrymal groove without tearing its coat, or opening any of the vessels found in the immediate neighborhood of the sac; especially is it difficult to avoid this in the fundus. It has been advocated to cut through the tendo oculi, beginning the incision about 2 *mm* above the tendon, in order to expose the upper end of sac and facilitate its removal. I have, however, in most cases been able to dissect out the sac from under the tendon, especially by the aid of my blunt hook made for this purpose. In cases where there has been extensive destruction of the sac, or its walls have become friable, one must cut the tendon or depend upon the curette. With care one can, in most cases, readily succeed in passing the blunt hook under the sac near its middle, after the manner of passing it under the tendon of the ocular muscles. This accomplished, the sac is easily and quickly freed down to its insertion into the upper end of the bony canal, from which it is cut off.

The bony canal is next thoroughly curetted, the instrument passing all the way through it, destroying the lining to the bone, with the object of favoring its filling up and becoming obliterated by healthy connective tissue. The wound is thoroughly cleansed by syringing, and then closed by deep and superficial sutures. If the tendo oculi has been severed, it must be replaced by one or two heavy stitches, so placed as to avoid passing the needle through the large blood-vessels surrounding this point. If we only extirpate the sac and do not destroy the canaliculi, there generally forms a blind pocket at the inner canthus, into which the secretion of the eye accumulates, keeping up an irritation. To avoid this I split the canaliculi throughout

their entire length, then place a flat platinum cautery point made to fit the cut surfaces, turn on the heat for a moment, sufficient to destroy all lining membrane and cause complete obliteration by granulation. Borated vaseline is placed over the wound, and a firm compress, shaped so as to make pressure over seat of sac, to favor ready adhesion of its walls, is held in place by adhesive strips, while we proceed to the second operation.

EXTIRPATION OF LACRYMAL GLAND.

I formerly shaved two-thirds of the eyebrow, and drew down the skin, so that while the incision was made along the margin of the orbit, the skin when allowed to recede brought the cut along the centre of the eyebrow, the object being to hide as much of the scar as possible in the eyebrow. (See Fig. 3.) The wound, however, leaves only a delicate scar, which soon fades entirely; while the eyebrows are of such slow growth that now I do not shave the brow, but make my incision below along the margin of the orbit (see Fig. 4), cutting against the bone, the incision beginning near the centre of the upper orbital arch, and, following the bony margin, it is carried to a point about 3 *mm* below the outer canthus; it will be seen from Fig. 5, where the course of the arteries and veins are outlined after Merkel, that we escape nearly all blood-vessels by following this line, so that hemorrhage, as a rule, is very slight. The fascia or septum orbitale (see Fig. 7) is cut through along its attachment to the orbital margin. It is at this point that confusion is likely to arise for the beginner. In the living, the resemblance between the orbital fat and the gland is sufficient to cause confusion (see Fig. 6), especially if the field of operation is partly obscured by hemorrhage. The normal color of the gland which authors speak of as rose-red, I have not encountered; those which I have seen were of a delicate pinkish yellow, especially by electric light (the source of illumination which I always use for operating in preference to daylight, as from an electric forehead mirror the operator can always inspect depressions and recesses otherwise in shadow). This wedge-shaped mass of fatty tissue, a pro-

longation of the orbital fat, and varying in size in different individuals and according to age, comes down from under the edge of the orbit between the layers of the lid. (See 4, Fig. 6, drawing made from dissection upon the fresh cadaver of a young adult; here it projected 4 *mm* below the orbital margin.) Should the fatty tissue present in the wound, it can be held to one side with retractors. Bleeding points from the edges of the wound must be controlled so as to leave a perfectly clear field for operation. The relation of the anterior edge of the gland to the bony margin of orbit varies slightly; in some the gland presents one to two millimetres below, but the most frequent position is two to three millimetres upward and backward from the edge of the bony orbit. There is a thin but distinct layer of fascia between the superior and inferior gland (see 10, Fig. 8), which hides the latter from view. Care should be exercised not to displace the orbital contents unnecessarily, or injure the levator palpebræ superioris, the superior or external rectus. The gland tissue is quite friable, and in order to be positive that nothing is left behind to invalidate the success of the operation, much care must be used in dissecting it out in its entirety. This is difficult at the end most deeply imbedded in the orbit, where the gland is very intimately connected with the orbital fat and connective tissue. The ducts upon the under surface of the gland also offer some resistance. By means of a slender, blunt-pointed pair of scissors, broad ocular fixation forceps, small abscess knife, and a pair of tenotomy hooks, one can with some patience dissect out the gland with but little change of its shape, thereby assuring the operator that the extirpation is complete.

If, in addition, we desire to remove a portion or all of the palpebral or secondary gland, a blunt instrument is passed through the palpebral fissure and the conjunctiva over the seat of the gland pushed by an assistant up into the wound, where the small nodular gland-masses mentioned above can be dissected out. I believe it best to avoid perforating the ocular conjunctiva, thereby lessening the danger of infection from the tear-sac wound. I have never encountered severe

hemorrhage, but that such may occur with total loss of the eye has been reported by Dr. H. Gifford, in the *American Journal of Ophthalmology*, 1889. I do not close the wound until all hemorrhage (excepting a slight venous oozing) has ceased. The wound is closed by two deep and three or four fine superficial silk sutures, covered with sterilized borated vaseline, gauze and cotton, and pad fixed with strips of isinglass plaster. Both wounds are then covered by a large pad of gauze and cotton, held in position by a roller bandage, unless there has been extensive suppuration of the tear sac with necrosis of bone. The dressing is not disturbed for three or four days, when some or all of the stitches are removed, depending upon the condition found.

CASES OF EXTIRPATION OF LACRYMAL SAC AND GLAND.

CASE I. History. John Seyler, age nineteen. Eyes were normal until the age of twelve, when he contracted diphtheria, which was followed by naso-pharyngeal catarrh and double purulent dacryocystitis with excessive lacrymation. The nasal catarrh disappeared, and the tear-sac inflammation also improved, but there was never entire cessation of secretion, which was frequently aggravated by acute exacerbations. Slitting of canals, probing and syringing were resorted to at irregular intervals during the five years preceding the time when he was seen by the writer, who instituted two months of systematic and careful treatment, but without improvement. Thick muco-purulent secretion could be expressed from both sacs. There was a firm stricture in the left canal which could be forced but not kept patent. Right canal could not be passed. Patient had undergone so much suffering from probing, injection of strong astringents, etc., that he was anxious for an operation, especially since I had extirpated the lacrymal sac from his mother two years before, with relief of all unpleasant symptoms excepting lacrymation (the gland in her case not having been removed).

Operation. Dec. 12, 1891. Chloroform anæsthesia. The right tear-sac and gland were extirpated. No fever. Dressing removed on the third day. Union by first intention. The result was so satisfactory to the patient that he asked to have the left side operated, which I did Feb'y 21, 1892, with the same result as on the right.

CASE 2. *History.* T. N. Age forty-seven. Has suffered for years from purulent dacryocystitis and annoying epiphora, much aggravated by a severe form of chronic conjunctivitis secondary to the tear-sac infection. Exposure to wind, or light, as well as close application caused free lacrymation and difficulty in using the eyes. The primary cause of the tear-sac trouble was a severe inflammation of the naso-pharynx with extensive destruction of the septum, and soft palate; periostitis had completely obstructed the bony portion of the lacrymal canal, so that treatment by probing was out of the question. Patient when seen was suffering from chronic sepsis; continuous fever ranging from 99° to 101° F., which I attributed to hidden bone necrosis, probably involving one or more of the accessory cavities, a surmise which afterwards proved correct, when I opened the sphenoid cavity and removed a large mass of dead bone from the anterior portion of the body of sphenoid, this being followed by permanent cessation of the fever, which had lasted for over one year, and had been attributed to various causes, but chiefly "chronic malaria."

Operation. April 23, 1892. Ether narcosis. Total extirpation of both lacrymal sacs. The operation did not cause any elevation of temperature above that from which he was suffering by reason of the chronic sepsis mentioned above. *Union by first intention.* Stitches removed on the fourth day. Pus having ceased to enter the eye, the chronic conjunctivitis yielded readily to treatment, but the lacrymation continued very troublesome, until on May 3, 1894, I removed *both lacrymal glands*. Stitches removed on the fourth day. Primary union.

CASE 3. *History.* L. K. Age nine. Has suffered from double purulent dacryocystitis of long standing. There had been suppuration of both sacs, resulting in double fistulæ. Treatment restored the right sac to normal function, but the fistula continued until cured by dissecting out a triangular piece of skin around the opening and covering it with a sliding flap.

The left sac, however, failed to yield to treatment, and on April 11, 1895, I removed *both lacrymal sac and gland* on the left side. Through the fistulous opening denuded and roughened bone could be felt on probing, so that while the wound of the skin over the seat of the gland healed by primary union, there was granulation of tear-sac wound in the inner canthus (at the caruncle), delaying complete union about two weeks.

CASE 4. *History.* Mrs. M. McG. Age fifty-four. Chronic purulent dacryocystitis, left side. Had suffered from epiphora for many years. During the last four years sac would swell at intervals and pressure upon it cause evacuation of muco-pus. Had received treatment at various eye clinics with indifferent results. For one year she had had repeated attacks of acute purulent inflammation of the sac, each accompanied by pain, fever, redness, and swelling. A careful examination revealed a firm stricture with false passage through walls of sac, either due to ulceration or probing. She had suffered so much from probing, etc., that she asked if it were not possible to relieve her once for all by a thorough operation.

Operation. March 10, 1896. Ether narcosis. Removed lacrymal sac and gland. Primary union of both wounds.

CASE 5. *History.* Miss M. Age twenty-nine. Gave the usual history of mucocele of long duration, finally passing into acute purulent dacryocystitis; recurrent attacks; prolonged probing and syringing, and in one of the acute attacks spontaneous opening of sac. When she first came I found the external opening had closed, a puckering scar indicating former seat of fistula; both canaliculi had been slit; sac swollen and too tender to permit of examination. Chloroform was administered with the understanding that if the examination revealed the sac in such condition that treatment would be of no avail, I was to extirpate the gland and sac. A probe entered readily through lower canaliculus downwards, backwards, and outwards, liberating pus; the probe came in contact with denuded bone along lower margin of orbit, and extending upwards and backwards under the pulley of sup. oblique. The sac and gland both extirpated. The diseased condition of the pericystic tissue necessitated extensive curetting of granulation tissue, even partly involving the caruncle. In order to follow up the granulating cul-de-sac, I was obliged to cut the tendo oculi, so that the lower lid dropped down from the globe like a flap, necessitating deep sutures to replace it. Dressing removed on the third day. *Primary union.* Stitches removed on the fourth day. Fig. 3, shows appearance on the sixth day. The abscess mentioned above did not heal without some granulation and a slight discharge of pus from the conjunctival side of canthus, so that about four weeks elapsed before all irritation ceased.

CASE 6. *Status Præsens.* H. P. Age five. Child rachitic;

teeth black and broken down ; chronic purulent dacryocystitis with fistula of sac, left side ; complete adhesion of soft palate to posterior wall of pharynx ; double otitis media purulenta, with total destruction of membrana tympani, and necrosis of ossicles in the right ear. (These were also extracted at the same time.) Hearing so defective that he had forgotten the few words he acquired at the age of two years, when all of these afflictions resulted from a violent attack of diphtheria.

Operation. February 19, 1897. Chloroform narcosis. Sac and gland extirpated. Primary union of both wounds. Notwithstanding his debilitated condition, suffering from severe nasal catarrh, double purulent otitis media, and having three distinct operations, to wit : tear sac, gland, and extraction of ossicles from middle ear ; his temperature did not go above normal.

CASE 7. History. C. K. Age thirty-five. Epiphora about twelve years. Nine years ago first noticed swelling of left tear-sac, which he could empty on pressure either into the eye or down into the nose ; contents always appeared "clear and thick." The discharge never ceased, but was worse when he had a cold. He had undergone prolonged treatment, and came into the Cincinnati Hospital asking for radical cure. Being informed that his case might be cured by tedious and careful treatment, he at first refused, stating that he was a poor man who could not spare the time necessary, besides he had no faith in the ultimate success, as former treatment from good hands had failed to relieve him.

Operation. April 2, 1898. Chloroform anæsthesia. Gland and sac removed. The latter was much thickened. Healing by primary union. Dressing taken off on the third day. As an experiment, I did not remove the stitches till the eighth day ; there was no reaction. On the tenth day the wounds in the skin had entirely healed, and the patient asked to leave the hospital. In two days he returned with a most violent coryza and slight tenderness and swelling over the seat of the sac. The wound of the skin showed no irritation, indicating that in all probability the infection was from the nose by way of the lacrymal canal. The inflammation not subsiding under antiphlogistic treatment, I re-opened the cavity, evacuated a small quantity of pus, leaving a granulating wound. He passed from my care before the parts had healed.

This case illustrates the importance of control over your patient in extirpation of the sac until the wound is firmly healed, because

of its direct connection with the nasal cavity. The bony canal being thoroughly curetted and its walls not collapsing as do the soft tissues about the sac, there is a wide avenue through which upward infection may pass from the nose as long as the canal is not yet obliterated by connective tissue.

The sac in this case was less affected than any of the other cases, and the cystic tissue was normal, while in most others it was also inflamed, yet most of these cases healed by primary union. My only explanation is that they were all private patients who avoided exposure and remained under control until they were cured.¹

CASE 8. History. Mrs. M. Age forty-four. Gives history of having suffered from epiphora, mucocele, and acute purulent inflammation of the right sac for fourteen years. Was treated in New York by probing and syringing; carried a style for some time. After "two years of torture" further treatment was abandoned, the sac was opened, and an attempt made to obliterate it by the use of some acid, requiring long and painful treatment. The tears continued very profuse, blurring her vision, requiring constant wiping, and causing excoriation of the cheek at certain seasons. This condition had existed for the last four years. Being a woman of refinement, and a constant reader, the tearing interfered greatly, and she came to me asking for a radical cure.

Operation. February 19, 1898. Chloroform narcosis. *Removed the gland* and the undestroyed upper part of the sac. Primary union of both wounds.

In the cases so far operated upon, I had only removed the large gland, but not the inferior or palpebral gland. Their *complete* extirpation through the same wound is not always an easy proceeding, as in many cases they are very small and difficult to differentiate. In this case, after removing the upper gland, which was unusually large, I searched for and removed as many of the nodules of the secondary gland as I could find, thus making as nearly as possible a *complete* extirpation; my reason for doing this being that in one of the other cases (No. 2) the secretion from the inferior or palpebral gland is, when the eye is irritated, sufficient to cause some annoyance, and as in this case the upper gland was unusually large and lacrymation very profuse, I feared that if left undisturbed the secondary gland would secrete enough tears to become annoying.

¹ Since writing the above I have been informed that this patient came under treatment again for a syphilitic affection of the nose.

CASE 9. *History.* Prof. D. Age forty-eight. Patient gives history of suffering from affection of the left tear-sac since he was one year of age. During all that time the tear sac has passed through numerous attacks of inflammation, from slight to the most violent, resulting in perforation and a permanent fistulous opening. Passed through various treatments at different times, till he finally became discouraged, and of late years had left it alone.

On Nov. 22, 1897, he consulted me and asked for the radical cure.

Operation. March 23, 1898. Mixed anæsthesia. Extirpation of gland, but the sac was so diseased that it could only be made out in part. The skin over the sac was so friable and puckered by repeated inflammations that it became necessary to excise a portion of it. Through the excessive curetting necessary to bring away all of the diseased tissue, the lower lid became detached from its insertion at the inner angle and sagged away from the globe. Replaced by sutures; primary union, even over the sac, without any recurrent manifestations later on. (See Fig. 4 taken on the sixth day.)

CONGENITAL DISLOCATION OF TEAR GLANDS. EXTIRPATION.

CASE 10. *History.* Miss C. G. T. Age seventeen. Had always noticed slight fulness of skin over seat of glands. At the age of thirteen years, when menstruation began, the fulness over the glands became more marked, associated with varicosity of vessels. The skin over the swelling seemed thinner than normal; the tumor was soft, with tendency to bag; lying loosely within it one could feel the gland, which was of normal size; the lower half of it could readily be grasped between the fingers, and slight pressure caused it to slip from between your grasp and disappear under the roof of orbit. When patient was excited, or when exercising, dancing, or at the time of her menstruation, the swelling would become so engorged as to almost resemble a nævus, disfiguring her and causing comment. Tear sac and eyes normal. No abnormal lacrymation, but patient demanded an operation which would relieve her of the annoying symptoms described.

Operation. Oct. 23, 1890. Ether anæsthesia. Removed the *right gland* and excised a portion of the redundant skin. There was very free hemorrhage from the superficial vessels. Closed

wound with eight sutures. Dressing and stitches removed on third day. Primary union.

Dec. 9, 1890. The *left eye was operated upon in the same manner* as the right. Result perfect.

EXTIRPATION OF LACRYMAL SAC.

CASE 11. Mrs. F. M. Age thirty-two. Has suffered for years from muco-purulent dacryocystitis ; left side. Has passed through the usual lengthy seasons of probing ; a false passage with circum-sacular abscess found.

Oct. 12, 1888, extirpated the sac under A.C.E. anæsthesia. Primary union.

CASE 12. Mrs. A. S., age forty, sister of the last-mentioned patient. Came with the usual history, asking for the same operation, which was performed on April 15, 1889. Chloroform. Primary union.

CASE 13. Eddie Boyer, age thirteen. Purulent dacryocystitis, with perforation of sac, left eye. April 30, 1893, extirpation of sac under chloroform. Primary union.

CASE 14. *History.* Mrs. N. McD., age eighty-four. One year ago, in Indianapolis, had been operated upon the right eye for cataract, followed by panophthalmitis and enucleation. Had a ripe cataract in the left eye. Being a woman who, mentally and physically, was wonderfully well preserved, she determined to try once more to regain sight. Functional examination of the eye favorable, but suffered from chronic catarrhal conjunctivitis.

Since losing one of my earlier cataracts due to infection from an unsuspected tear-sac trouble associated with ozæna, I never examine a case for cataract operation without a careful exploration of nose and tear duct and syringing of the latter as a test. Firm pressure by the finger failed to bring forth the least sign of secretion, but syringing brought forth a small quantity of thick yellow pus from the sac, which the microscope showed to be rich in strepto- and diplococci. Extraction under such conditions would likely cause a repetition of what had happened to the right eye. Probing and treatment were out of the question, as she neither could nor would submit to it on account of the pain.

Operation. October 14, 1896. Ether anæsthesia. Extirpation of sac. Primary union.

On account of her age I desired to shorten the operation, and

did not remove the lacrymal gland, as I thought any exposure causing tearing would be largely avoided in her case. The following six weeks were devoted to cure of the conjunctival inflammation. Dec. 2, 1898, made extraction with iridectomy. Final vision after discission was $\frac{20}{80}$ with + 10 D, and Sn. No. 1 with + 13 D. The only annoyance she has is tearing upon exposure, and had I the operation to do over again I should certainly remove the orbital gland.

RÉSUMÉ OF CASES.

BROUGHT UP TO MAY 15, 1898.

Reports of surgical cases may, at the time of the operation and immediately after, appear very satisfactory, and yet the good result be transitory, *time being the only valuable test*. I therefore re-examined all the cases (excepting No. 4, of whom I have lost track), and have placed them below in the order they were operated upon.

CASE 10. C. T. Double extirpation of dislocated glands in 1890. In response to my letter of inquiry, the following reply was received, which I take the liberty of quoting verbatim, as it expresses her feelings upon the subject uninfluenced by the doctor's opinions.

"CARTHAGE, KY., Apr. 4, 1898.

"MY DEAR DOCTOR :

"Your letter came this morning. In return will say that the operation was a perfect success. My eyes are entirely well. They have never given me the slightest trouble since the operation, and I am very grateful to you. Will be in Cincinnati very soon, and certainly call at your office.

"Yours very truly,

"C. G. T."

This patient presented herself about two weeks after writing the above letter, and was examined with the following result: the scars from the incisions are no longer visible excepting upon careful search. Varicose vessels and hyperæmic condition of the skin, which existed before the operation, have entirely disappeared.

Vision perfect, right and left, for distance and near. Recti muscles balance perfectly. Patient is unable to weep, but irritation of eyes by chemicals produces a *very slight* moisture from secondary glands, more in the right than the left.

CASE 1. Extirpation of *both sacs and glands*, 1891-92. Re-examined April, 1898. (See Fig. 9.) Excepting upon careful examination, one fails to see line of incision. Eyes have never caused him any annoyance since the operation. Cannot weep, and only upon *marked irritation* is there slight amount of lacrymal secretion perceptible. Vision normal.

CASE 2. Extirpation of *both sacs* in 1892, and of *both glands* in 1894. This is the only one of the cases where the operation has not given complete relief from tearing. Under strong irritation to the eyes, tears can accumulate in sufficient quantity to be annoying.

CASE 3. L. K. Extirpation of lacrymal sac and gland in 1895.

Re-examined April, 1898. The right tear sac, a fistula of which was closed by skin flap, has remained normal. The left eye has been normal since the operation. Vision unchanged. When crying, the left eye becomes moist, but there is no overflow of tears, but free tearing from the right.

CASE 4. Lost from observation.

CASE 5. Re-examined April, 1898. Eye has been normal since she was discharged. Entirely free from epiphora; only strong irritation causes a perceptible moisture of globe. Vision of operated eye normal.

CASE 6. Re-examined February 19, 1898. Eye normal since operation.

CASES Nos. 7, 8, and 9 are of special interest, because from Nos. 7 and 9 I removed, in addition to the large gland, some of the nodules making up the palpebral portion, and from No. 8 I removed all (or as much of it as I could find).

The eyes were carefully re-examined after the operation, in order to see what changes, if any, had taken place, with the object in view of determining if, in addition to the removal of the superior gland, the removal of all, or even a portion of the secondary or palpebral gland would still leave the eye sufficiently lubricated from the secretions of the mucous glands. In Case 8, on the sixth day after the operation, when my assistant, Dr. Vail, was testing the patient, he found that the vision, which before opera-

tion had been $\frac{3}{8}$, was only $\frac{2}{4}$. A careful examination of the eye revealed nothing abnormal excepting that one could detect a slight amount of mucus upon the cornea. He therefore flushed the eye with a normal salt solution, and found vision at once restored to $\frac{3}{8}$. It was very evident that while the eye received enough lubricating fluid to make it feel comfortable, there was an insufficiency of the watery solution to keep the mucus from adhering to the corneal surface. She was examined from time to time, and in two weeks the moisture had again become sufficient to keep the cornea clear of mucus, and vision was normal, no doubt due to the increased function taken on by a few nodules of the palpebral gland which escaped me, or increased action of the retrotarsal glands. This patient reported on June 1, 1898, by letter :

“ LYONS FALLS, N. Y., June 1, 1898.

“ My eye is a perfect success. . . . In behalf of suffering humanity surely the least I can do is to tell them to weep no more, but to obtain absolute relief by a radical operation.”

CASE 9 gave the same result as above, but the return of sufficient moisture to keep the cornea free from mucus was much more rapid than in the former case ; and examination of the eye on May 26, 1898, found it normal.

The cases upon whom I performed extirpation of the sac only, 11 and 12, were also re-examined in April, 1898. There has never been any recurrent trouble from the region of sacs, but both suffer greatly from epiphora, especially in winter, and will probably have the glands removed in the near future.

In the preparation of this paper I dissected fifty anatomical specimens cut so as to demonstrate the accessory cavities, lacrymal canal, and turbinated bodies (preserved in Wickersheimer's solution or alcohol).¹

I give the average measurements from all of these specimens, showing the relation of *the outlet of the nasal duct* to the lower edge of the inferior turbinated, the floor of the nose, and the entrance to the nares, as follows :

¹ These specimens were demonstrated at the Convention.

	GIVEN IN <i>mm.</i>		
	Greatest	Least	Average
Distance of outlet above floor of nose.....	22	9	16
“ “ “ above the anterior insertion of inferior turbinated.....	10	1	6
“ “ “ from anterior edge of nostril or labio-nasal junction (in the denuded skull it is about 15 <i>mm</i> less)..	34	25	30
“ “ “ above lower edge of inferior turbinated.....	14	3	10
Transverse distance between the inferior turbinated and wall of antrum of Highmore, at the point of greatest inward curvature of inferior turbinated (hardened specimens).....	11	2	6

In three of the specimens in which the inferior turbinated is abnormally small, the outlet is 1, 3, and 5 *mm* below the lower edge of turbinated. In the hardened specimen, the outlet of canal is round or oval, but in fresh sections nearly always slit-like,—so fine that it is often difficult to find it by direct examination of a fresh specimen, especially if the mucous membrane is swollen. The canal may also open at the highest point under the inferior turbinated, or, as it frequently does, pass obliquely through the mucous membrane and come out from 1 to 10 *mm* farther down.

Bearing these points in mind, one can scarcely pay serious attention to the statements now and then seen, which speak glibly about probing the canal through the lower duct. Only in exceptional cases is that practicable. One thing is certain, that probing or use of syringe from below up must be gentle, for one can easily injure the membranous lips and cause adhesions.

Of the glands extirpated, the largest was from No. 8, length 30 *mm*, width 13 *mm*, greatest thickness 8 *mm*, weight 1.3 grammes. Sections were made, by Dr. H. C. Whitacre, from this gland (see Figs. 11 and 12). In Fig. 12, in which a simple lobule is shown, the central canal is well demonstrated. From it we can follow up the terminal duct with acini clustered about it.

SYNOPSIS.

The ages of patients ranged from five years to eighty-four years. As to sex, six were males, eight were females.

In three cases there was double extirpation.

Counting each side as one operation, we find 17 operations, 7 times upon the right, 10 times upon the left.

There was primary union over sac 16 times.

Wound over sac healing by granulation once (Case 7).

There were 13 extirpations of the lacrymal gland, with primary union in every case.

ADDENDUM.

In order to simplify matters for the student, it were better if only one instead of several names were used for each gland, as is the case at present, to-wit :

The larger lacrymal gland,	{ Superior lacrymal gland.		
	Orbital	"	"
	Primary	"	"
The smaller lacrymal gland,	Inferior	"	"
	Secondary	"	"
	Palpebral	"	"
	Accessory	"	"

while the glands located in the loose cellular tissue under the conjunctiva along the upper edge of tarsal cartilage, to the number of about forty in the upper and two or more in the lower, are designated by the following names :

1. Glands of Krause.
2. Glands of Waldeyer.
3. Posterior tarsal glands.
4. Acino-tubular glands.
5. Accessory lacrymal glands (Henle).

I would suggest that the tear glands be designated as *superior* and *inferior*, and the others as the "*posterior tarsal glands*," their location being indicated by this name. Whether or not these glands should be classified as accessory lacrymal glands or as mucous glands appears to me not to have been positively determined as yet ; if accessory lacrymal glands, are they stimulated to activity by emotion, or by direct irritation of the eye ? Is their secretion identical with the tears, or modified ? I am not aware that any secretion which was *positively* known to come from the posterior tarsal glands has been analyzed ; *as most of these glands are only a fraction of one millimetre*, and none probably ever over *one millimetre* in diameter (Merkel), sufficient secretion for analytical purposes could only be obtained from cystic formation, and Dr. Stoewer, in *Klin. Monatsbl. f. Augenh.*, 1892, has reported the only indisputable case of "Cysts of the Glands of Krause" that I have been able to find, and, unfortunately, the

contents were lost through rupture of the cyst walls during the process of extirpation ; but he describes them as cysts 4 and 5 *mm* in diameter, and, as well as could be noticed at the moment of rupture, their contents appeared as a thin, serous fluid. But whether the secretion from these glands under normal conditions is the same, is, I believe, still an open question. If their secretion is identical with that of the tear gland, it must be in very limited quantity, as proven in my cases of total extirpation by the absence of tears when the eyes were irritated, proving conclusively that the main, if not the entire, supply of tears is derived from the superior, and a variable but never large quantity from the inferior, lacrymal gland.

I certainly must take exception to the following statement in Roosa's text-book, 1894, page 12 : "The lacrymal gland actually furnishes but a small portion of the tears, the conjunctiva furnishing most of them."

L. de Wecker (*Progr. m d.*, 1897, No. 47) reports a case where he extirpated the orbital gland without the slightest result. Later he extirpated the palpebral gland, when the epiphora ceased. The carefully observed results of my thirteen cases of *total* extirpation of the orbital gland certainly do not coincide with the result obtained in De Wecker's case. It stands to reason that, if we take two glands identical in structure and function, but one from ten to twenty times larger than the other, the stimulating cause being the same and equally exerted upon both glands, the larger gland must deliver a correspondingly greater amount of tears.

DECLINATION OF THE VERTICAL MERIDIANS OF THE RETINA.

By GEORGE T. STEVENS, M.D., PH.D., NEW YORK.

IN the article entitled "The Directions of the Apparent Vertical Meridians," etc., which appeared in the ARCHIVES OF OPHTHALMOLOGY, No. 2, 1897, I treated the subject from the physiological standpoint mainly. In a brief article which appeared in the *Ophthalmic Record* somewhat later,¹ the more practical side of the subject was treated.

It can not be said, however, that any discussion of the subject of retinal declination from a practical point of view, and which is in any way commensurate with the importance of the subject, has thus far been made public.

It is with a view of presenting a few of the more conspicuous facts and more important deductions that this article is prepared.

In order to avoid confusion arising from the consideration of somewhat similar phenomena having their origin in entirely different classes of causes, it will be advisable at the outset to recognize two distinct classes of declinations: first, those which are the normal though irregular consequences of the peculiarities of development of the intra-orbital structures. Such peculiarities are, doubtless, often, if not generally, governed by the conformation of the bony walls of the orbits. These constitute a class of normal anomalies, dependent, so far as is known, on no disease or disability of any muscle or set of muscles.

¹ "Some New Methods of Examination of the Position of the Vertical Meridians of the Retinas," *Ophthalmic Record*, May, 1898.

Just as hypermetropia is a constitutional state of the eye, so these declinations represent the constitutional adjustment of the globe of the eye in relation to the technical primary position of the cranium.

The second class includes those tiltings of the retinal image which have long been recognized in connection with certain diseases or disabilities of the muscles of the eyes; as, for example, the tilting so conspicuous with paralysis of the superior rectus or the superior oblique.

Such tiltings, arising from any form of muscular disability, are as characteristically differentiated from the normal anomalous positions of the retinal meridians, as are the phenomena of diplopia in concomitant squint from those of paralytic strabismus.

It will, then, since the normal anomalous conditions are frequent, and those from disabilities rare, sufficiently classify the two groups if the first is recognized as *anomalous declinations*, or simply *declinations*, while the other group is called *pathological declinations*.

The first class, anomalous declinations not related to disabilities of the muscles, had, previous to my own contributions, obtained no recognition as a practical subject, if indeed it had been recognized at all, although it is probably one of the most practical of the various important phases of the adjustments of the eyes.

Aside from the crude, indefinite, and not always correct methods which were in vogue for ascertaining the tilting in cases of paralysis or paresis, and the entirely unreliable methods employed by physiologists to find what was the supposed position of the "apparent vertical meridians," no means for precise determination of the position of the meridians had been suggested previous to the introduction of the clinoscope. It is not too much to say that this new means of research has opened up a most important field of inquiry.

Leaving out of consideration the group of pathological declinations, this article will be devoted exclusively to normal anomalies, and the subject will be examined from the standpoints:

1. The general facts of retinal declinations.

2. The influence of declinations upon the eyes—the local influence.
3. The more general influences.
4. The more recent observations for determining the true measurements of declinations, and
5. The question of treatment.

GENERAL FACTS OF RETINAL DECLINATIONS.

Hypermetropia, was, before the era of Donders, regarded as a “weakness” of the eyes. Now it is known that the condition has no dependent relation to weakness or strength of any part of the eye. No more are the declinations, which we are about to consider, dependent upon the strength or weakness of any structure. They are anomalies in the sense that they are deviations from a rule which should prevail where the ideal conditions are present. They are anatomical peculiarities which vary from the typical state, but which are probably much more common than the typical state.

The vertical meridian of the retina is that meridian which, when the image of an upright straight line falls upon it, should give the impression of an exactly vertical straight line.

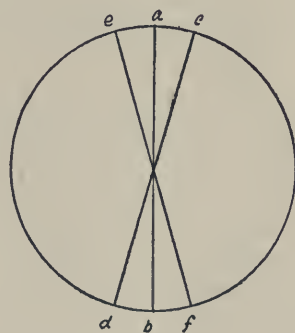


FIG. I.

If, for example, the line *a b*, Fig. I, is the vertical meridian, and occupies the exact vertical position when the head and body are erect, the image of a vertical line will fall upon this meridian. But if the eye is rotated on the optic axis so that the meridian occupies the position *c d*, the image of

the vertical line falls where it did before, but does not now coincide with the true vertical meridian, but with the meridian which previously occupied the position ef , and the image will appear to lean in the direction of ef and not in that of cd , which is actually occupied by the real vertical meridian.

If the distance $ac = 5^\circ$, and if c is at the temporal side of a , then there is positive (+) declination of 5° .

The vertical meridian is selected for location simply for convenience—any other meridian would serve as well if it were equally convenient. The declination of one meridian from the typical position represents the variation of every meridian. Hence, when the position of the vertical meridian is stated, it indicates the relative positions of all other meridians.

In the typical state of adjustments of the eyes this meridian, when not directed elsewhere by voluntary effort, should, the head being exactly in the primary position, be precisely vertical.¹ As a matter of fact it seldom occupies this position.

A belief has hitherto prevailed among physiologists that there is, in healthy eyes, a fixed and definite position of the meridian which is universally prevalent. And it is interesting to note that each physiological observer, when by his experiments he has thought that he has located the position for his own eyes, has at once drawn the conclusion that that is the true position for all eyes.

This has led, of course, to various opinions, none of which was based upon correct data. The idea that there is a fixed and definite position for this meridian is no more correct than would be the idea that, because an observer should find a dioptré of hypermetropia in his own eyes, he should draw the conclusion that that is the type on which all eyes are constructed. There is as much variation in the position of the vertical meridian in different individuals as there is difference in the refractive states of the eyes of as many persons.

It was the failure to recognize this fact that led Helm-

¹ Stevens, ARCHIVES OF OPHTHALMOLOGY, No. 2, 1897. This is not the view that has prevailed, although some physiologists have entertained it.

holtz, when by crude methods he found that the vertical meridians of his eyes appeared to deviate from the true vertical position, to reason that what he observed in his own case must be typical for all, and upon the basis of this incorrect conclusion he constructed his remarkable mathematical demonstration of the horopter which no one else could confirm.

It may be assumed that there is a definite relation between the precise position of the insertions of the motor muscles of the eyes and the degree and direction of declination, but the necessity for much additional anatomical data before attempting to formulate the elements of the problem in a given case is apparent.

In general terms, however, it may be stated that anomalous declinations are the results of anomalous insertions of the motor muscles. It is no more to be expected that in every case the muscles will be so inserted into the sclera as to adjust the vertical meridian exactly vertically, than it is to be expected that all eyes will have the same length in proportion to the diameter.

With certain forms of the orbit there are certain characteristic and very pronounced declinations. When the orbits are quite symmetrical, it may be expected that the declinations, when existing, will be uniform; that is, if one is positive, the upper part of the meridian leaning outward, the other will also be positive. In other cases, when the orbits are not symmetrical, there is generally a want of symmetry of the declinations. Thus, the vertical meridian of one eye may be really vertical, while the other has a positive declination, or one may be negative and the other positive; in other words, the upper part of the meridian of one side leans toward the nose, and the other toward the temple.

In extent, the declination may be anywhere from a half a degree or less to many degrees. A declination of 4° or 5° is not at all uncommon, but it is rare to find such declinations for each eye in non-strabismic cases unless one is positive and the other negative.

As in refraction there are few, if any, eyes that are perfectly emmetropic, so there are few eyes which are abso-

lutely free from some measure of declination. Here we may draw another comparison. As in ametropia very slight anomalies may be disregarded and the eyes be considered practically emmetropic, in like manner a small extent of declination may be ignored. As the result of observations since the clinoscope has been brought into practical use, I have arrived at the conclusion that a declination which does not exceed a single degree for the two eyes may generally be disregarded. A declination exceeding a degree is not an immaterial condition. If, for example, there should be found a declination of 1° for each eye with the same sign, positive or negative, it appears to be of about the same practical consequence, to make a rude comparison, as .75 D. astigmatism for each eye.

As in the case of refractive anomalies, the higher the grade of error the greater the disturbance, as a rule, the same principle holds with declinations. But as in many cases of high grade of refractive error no definite evil results are observed, so considerable anomalous declination may be unattended by noticeable disturbances.

SOME OF THE LOCAL EFFECTS OF DECLINATIONS.

As indicated in the last remark, it does not follow that any noticeable disturbance must result from a declination of either high or low degree. That disturbing effects do very often result from such anomalies will be strikingly evident to anyone who will take the trouble to intelligently investigate the subject.

Locally there may arise the ordinary symptoms of asthenopia or such irritation of the conjunctival membrane as may arise from the action of the eyelids in aiding the ocular adjustments. In fact, many of the more common disturbances which are often associated with heterophoria may have their origin also in declinations. There are some conditions, however, attendant upon declinations which are more distinctly characteristic of these than they are of heterophoria. As a matter of fact, the conditions of heterophoria are themselves not unfrequently the direct results of declinations, and disappear when the declinations are corrected.

As an example of a heterophoric condition which may arise from declination, perhaps the condition most easy of analysis in this connection is that of exophoria.

Early in my studies of the conditions of heterophoria, the conviction that exophoria is often if not usually a secondary condition depending upon some more radical anomaly, became almost a certainty. In more than one of my contributions to the subject of heterophoria this view has been presented.¹ Strong confirmation of this view will be found in the following analysis :

Let us suppose a moderate case of exophoria with abduction in excess of 8° . Examining by the clinoscope there will, in a great majority of cases, be found a positive declination² for each eye. Let it be assumed that this $+$ declination is 2° for each eye.

Now, in the adjustments of the eyes for binocular vision, indeed for any vision, the first instinct is to place the vertical meridian (which would of course affect all other meridians equally) in such a position as to coincide with the image of a vertical object. In using the two eyes, this is the first essential to receiving the different points of the image of an object upon corresponding points of the retina. In order then to correct this leaning out of both vertical meridians, the eyes must be rotated upon the optic axes. In this case the rotation is accomplished principally by the superior oblique muscle. Hence, this muscle of each eye is brought into action disproportionate to that of other muscles.

The action of these oblique muscles is not simply that of rotation on the optic axis. Each muscle not only rolls the eye on the axis, but it turns it down and out. The downward motion, if the declination is equal, will be equal for the two eyes and will cause no hyperphoria, but the outward movement is decided for both eyes and must of necessity give rise to exophoria.

The fact that a condition of exophoria can be thus induced,

¹ See, among other articles, ARCHIVES OF OPHTHALMOLOGY, 1889, page 378 *et seq.*

² In the system of *declinations* a leaning of the superior extremity of the vertical meridian towards the temple of the same side is *positive* declination, while a leaning towards the nose is *negative*.

not of necessity by any disproportion in the rotating ability of the internal and external recti, will at once explain what must have been the disappointing experience of every surgeon who has often operated for exophoria, that a disabling of the rotating power of the external recti far out of proportion to the degree of exophoria has been required for even a temporary relief from the exophoria. The relief is indeed temporary, for in a majority of cases, unless the externi have been practically and permanently disabled for rotation, the exophoria returns in about as high a degree as before. And why should it not? It was not originally caused by the superiority of the externi over interni, but by the over-action of the oblique muscles, an over-action which remains after disabling the externi.

It is unnecessary in this connection to enter upon the consideration of the details of other forms of heterophoria in their relation to declinations, but these general rules, to which there are some exceptions, may be mentioned:

1st. That, with exophoria, nearly symmetrical positive declination or nearly symmetrical negative declination is the rule. With the class of cases most commonly met with in this country in private practice, the negative form is rare.

2d. With esophoria, the rule is that there is positive declination for one side, and negative for the other.

3d. While hyperphoria is more frequently an original state than esophoria, and still more frequently original than exophoria, it is, especially in low and moderate degrees, often a manifestation of the tensions arising from declinations. It is in such cases found in connection with declinations which are quite unequal in degree in the two eyes, as, for example, where the declination of one eye is 0° , and of the other $+3^{\circ}$.

By taking into consideration the very important conditions anophoria and katophoria in connection with the declinations of the meridians, the phenomena of converging and of diverging strabismus may be explained in a rational manner. It is not the purpose of this paper to discuss the general subject of strabismus, but in passing it may be stated that one who has a clear understanding of the normal

actions of the various motor muscles of the eyes may, keeping the above rules in mind, without more difficulty than attends the solution of any problem with several elements, account for the various forms of concomitant squint from these two factors, declination and ano- or kato-phoria.

That, in forms of adjustment of the eye in which those muscles which surround it almost like a band are held at an abnormal tension, there should under certain circumstances result a loss of the normal sphericity of the globe is quite to be expected. That the elongation of the globe in myopia is the result of a pressure of the eye muscles upon the globe has been the opinion of many eminent thinkers. While one class has thought that the tension from the correction of exophoria is sufficient to account for the change of form, another class has thought that the direction of the course of the oblique muscles afforded a better explanation.

It may well be thought that the constant pressure brought to bear by both the oblique and straight muscles in marked cases of declination may influence the form of the globe, but there must be a combination of circumstances to induce such a result.

In the first place, the scleral walls must be in a plastic condition. Such a condition may be one of the reactions from the tensions of heterophoria. A reddening of the conjunctiva or of the borders of the lids very frequently tells of the tensions of heterophoria, and the sclera may suffer a change of nutrition in the same way. When the eye is in this plastic state and the tension of the muscles which encircle it is much too great, there is every reason to expect the eye to yield to the pressure. Myopia is a progressive disease. If, with the first indications of the elongation of the globe, the conditions which induce hyperæmia and which cause unfavorable pressure are removed, a very rational expectation may be entertained that the farther progress of the elongation of the globe may be arrested.

One of the most characteristic local effects of declinations is the amblyopia which is in many cases associated with it. Such amblyopias are found in high degrees of heterophoria, in strabismus, and in high grades of astigmatism. It is

probable that even in these the defective vision is to be attributed in large degree to the declinations.

It is not proposed to mention the many forms of disturbance of the eyes which may result from anomalous declinations, and those already mentioned will suffice as suggestions of the general manner in which these defects may act.

GENERAL EFFECTS OF DECLINATIONS.

Coming to the more general effects of declinations, without entering upon details, it may be said that many of the nervous reactions which result from heterophoria may also have their origin in the normal tiltings of the meridians. Vertigo, for example, is one of the most characteristic of the neurotic symptoms arising from declinations, and that highest manifestation of the vertiginous condition, epilepsy, finds perhaps its most important factor here. That surprisingly good results have followed the correction of refractive errors and heterophoric anomalies in the treatment of this affection is, doubtless, in some measure at least, due to a removal of some of the complicating effects of declinations. With the removal of the declinations themselves even a greater measure of success can be expected, and this expectation is already being realized. In a number of instances in which improvement had resulted from the treatment of heterophoria, but in which a complete cessation of attacks had not occurred, since attention has been directed to the declinations the attacks have entirely ceased during periods long enough to make it sure that the controlling element has at length been reached.

From these examples it will be seen that the influences of these unfavorable adjustments are not only varied but of great importance. Much could be said in detail, but to those who are already familiar with the results of heterophoria these suggestions will be sufficient.

THE MORE RECENT OBSERVATIONS FOR DETERMINING THE TRUE MEASUREMENTS OF DECLINATIONS.

The clinoscope, as described in this journal in the article already referred to, was soon found to be in certain respects

imperfect. For example, with the tubes open at the proximate ends there was a possibility, and even a probability, that the head of the observer would not be held in the exact primary position. With a leaning of the head only a few degrees toward one side or the other, the determination of the position of the vertical meridians was vitiated. To remedy this, the tubes were supplied with discs with very small stenopaic openings exactly at the equator, and these

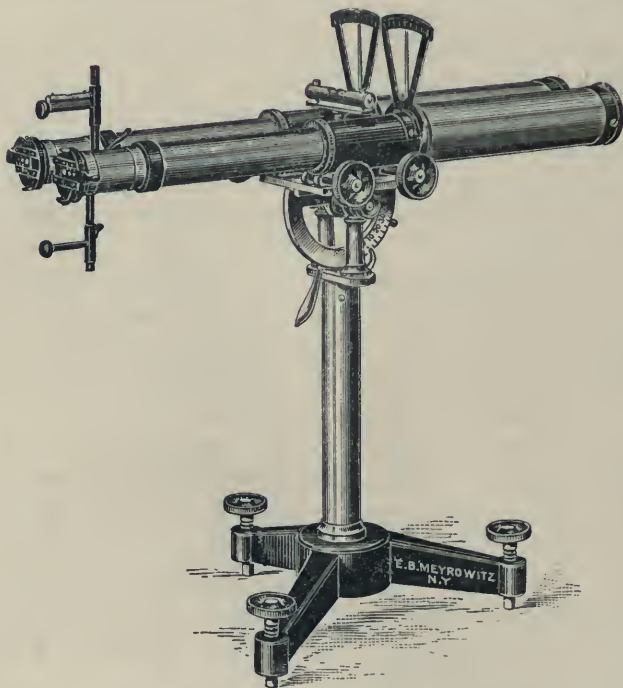


FIG. 2.—The Improved Clinoscope.

openings were so movable in the lateral direction that they could be adjusted to any pupillary distance. By means of a spirit level, the instrument could now be so placed that when the eyes looked through these very small openings they must of necessity be exactly in the same horizontal plane. This assured the technically exact position of the head. Other accessories were added to make sure that the head is erect in respect to any forward and backward lean-

ing, and still other modifications rendered the instrument more practical. As finally completed, it is figured in the accompanying cut. (Fig. 2.)

Only a single diagram is needed for general practical use; that is adjusted with minute accuracy and is made permanent.

The desire to introduce an instrument which would involve less expense led to the construction of the "lens clinoscope" which was described in the *Ophthalmic Record*, May, 1898, and the figure of which is reproduced here. After some refinements in the construction I find it a useful instrument in a class of cases in which the clinoscope is of little service. This is the class of amblyopics, from disease or strabismus, who fail to see the delicate lines of the clinoscope, but who will recognize the position of the lines in the lens clinoscope.

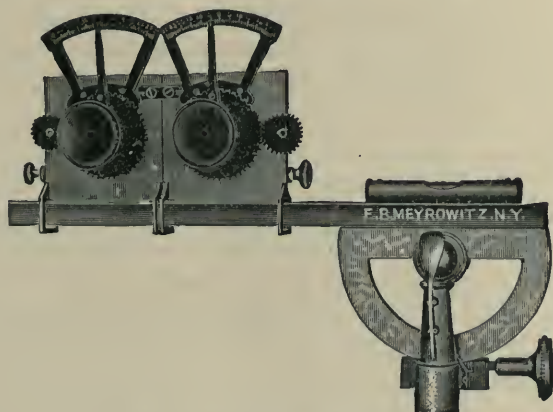


FIG. 3.—The Lens Clinoscope.

For very precise determinations it cannot always be relied upon. If the line of sight is precisely along the axis of the lens, the image is seen in its real position; but with a lens of 30 or 40 dioptries, a slight deviation of the line of sight from the lens axis must be attended by a declination of the image. By elongating the stenopaic opening to a tube of a few millimetres in length, this objection is largely removed, but at the expense of the length of the lines. The lens clinoscope is an excellent auxiliary instrument, but can

not yet supersede the clinoscope, which in its nature is free from any possible optical defects.

I also devised and, simultaneously with a colleague, described and figured an instrument in which a series of glass rods was used before each eye to give, behind the prisms of the phorometer, two parallel streaks of light. The very conspicuous optical defects necessarily incident to such an instrument, as well as the absence of means to maintain even approximately the proper position of the head, which is so absolutely essential, led to the abandonment of any attempt to perfect the instrument.

SOME SUGGESTIONS ON THE USE OF THE CLINOSCOPE.

The results to be found by the help of the clinoscope, to be of value, demand on the part of the investigator much care and judgment. Like the microscope, the clinoscope can show a good many things which do not exist except in the mind of the observer. This is no argument against the use of either. Without attempting to lay down any precise rules, a few general suggestions will not be out of place here.

In order to obtain exact results, the two optic axes must be in the same horizontal plane. If the instrument is exactly levelled and the two eyes see simultaneously through the pin holes, the eyes must of necessity be in the required position. The surgeon should therefore in all cases where it is practicable assure himself that both parts of the haploscopic figure are seen at once. In high degrees of strabismus this is not practicable, and he must use every precaution that the head does not change position in changing the eyes. At the first examination many persons fail to decide correctly as to the position in which lines are vertical. The examination should be continued a few minutes, the examiner changing the position of the lines little by little until the patient has had some practice. Let one half the figure be located first, then the other. It is not every patient who can unite the parts of the figure at first. If not, it is better generally not to use a prism for uniting, as each part can be located separately.

It is best that the patient should not handle the rotating screw-heads himself, since the muscular sense of the hands and arms is strongly suggestive to the eyes, and the eyes should have no extraneous assistance. The body should be perfectly erect and the hands passive. Not until the examination on the third or fourth day should the surgeon accept as unqualified evidence the belief of the patient as to the position of the lines. By the second or third day most patients have learned to be very correct. Unless the conditions are notably pronounced and the tests very uniform, examinations which are expected to be followed by operations, either for heterophoria or declination, should be continued more than three or four days. No suggestion as to the real position of the line should be made to the patient during examination, and he should hold the eyes at the instrument, and very close to it, until the locations of surrounding objects are, so to speak, forgotten by the eyes.

THE QUESTION OF TREATMENT.

This must be considered in connection with the treatment of heterophoria if it exists, or of the conditions of anophoria or katophoria should either be present.

It may be said in the beginning that, except where strong refractive glasses are to be used, lenses do not correct declinations. Very strong convex (or concave) glasses, if badly centred, will cause declinations, and if these declinations happen to be in the right direction they will neutralize the retinal declinations which are normal to the eyes. In certain cases of strabismus, strong convex lenses, by acting as prisms, with their bases up and down, and by neutralizing to a greater or less extent the declinations, will serve as temporary aids in keeping the eyes nearly parallel. This effect of glasses has been the strongest argument in favor of the doctrine of the relation between hypermetropia and strabismus.

Such a neutralization, it is very evident, must in the nature of the case be extremely rude and unsatisfactory even where strong glasses are demanded. Prisms are of no direct service. So far as the symptoms of heterophoria are relieved

by prisms or decentred glasses, the eye muscles are rested, and if only one element of the defect remains, it is more easily managed than when there are more than one.

If operations are to be done for heterophoria, much can often be done at the same time for the correction of declination. The same may be said, but with greater emphasis, in regard to anophoria or katophoria.

Let a case be supposed in which, with positive declination for each eye, there is, as shown by the tropometer, upward rotation of 40° of arc, downward of 42° . It is not only safe but very often desirable in such a case to reduce the upward rotation and add to the downward rotation. Should this be determined upon, and should 5° (prism = $2\frac{1}{2}^\circ$ of arc) be the extent of relaxation desired, a tenotomy may be done on the insertion of each superior muscle, carrying the section to the extreme inner border of the insertion but sparing the ultimate fibres, while a considerable bridge of the outer portion of the tendon insertion remains untouched. By such an operation the desired relaxation of the superior rectus can be obtained, and a declination as high as 4° or 5° may sometimes be corrected. It is unnecessary to add that such an operation demands a good deal of care and skill.

On the same principle operations for hyperphoria, esophoria, or exophoria may be combined with the correction of declination.

It should be remembered, however, that in many cases of heterophoria the correction of the declination carries with it the correction of the heterophoria.

If the operative correction is to be for the declination only, it can be done by either of the two methods which I have already described in the *Ophthalmic Record*.¹ The first is by the method which I have called *peritenotomy*, which may be *lateral* or *vertical*.

In doing lateral peritenotomy for a positive declination, the internus is relaxed at the *lower half* of the insertion, carrying the separation up to the centre and down to the ultimate fibres at the lower border. An exactly similar relaxation is done at the upper half of the externus.

¹ May, 1898.

If it is desired to obtain a considerable effect, the insertion may be separated a little above the middle of the inner rectus and a little below the middle of the external, but such relaxations should be made with the greatest care lest the lateral rotation either in or out should be restricted.

On the same principle, peritenotomy may be done on the vertically acting muscles: *vertical peritenotomy*.

The other method is by contraction of the half or two thirds of one tendon and the half or more of the other diagonally opposite of the opposite tendon. This operation, *circumtraction*, *lateral* or *vertical*, may be made to accomplish more than the method of peritenotomy, but it has the great disadvantages of all advancements, the uncertainty of the ultimate effect, the swelling and irritation during healing, and the thickening and adhesions at the point of operation.

In cases in which very pronounced results are sought this is the more effectual method, but a method to be avoided when small corrections are looked for.

EXPERIMENTS ON THE GERMICIDE PROPERTIES OF CERTAIN EYE SALVES.

BY ROSA WELT STRAUS, M.D., BROOKLYN.

THE following experiments were made with the salves used in the Ophthalmic Clinic in Berne (Switzerland). I examined only those salves which were supposed either to restrain or arrest the development of bacteria; others in use there, containing atropin, eserin, etc., were not examined. The work was done in the Bacteriological Institute in Berne.

I experimented with :

Vaselineum album purissimum,
Acid. bor., 4 %
Hydrarg. oxid. flav., 2 %
Aiol, 5 % and 10 %
Aristol, 5 % and 10 %

Iodoform, 5 % and 10 %
Thioform, 5 % and 10 %, and
Iodon, 5 % and 10 %
Iodia, ¹ 5 % and 10 %

The two latter, though not in use for the composition of eye salves, (and whose cauteric qualities make it doubtful whether they can be thus used at all,) were added on the wish of Prof. Tavel, who was at the time experimenting with them. All the salves examined were prepared with the pure white American vaseline. They were examined with regard to their action on

Pyocyaneus
Staphylococcus aureus
Bacterium coli.

The experiments were made in two ways :

I inoculated nutrient agar in Petri's dishes with pure cultures of the bacteria mentioned above. The inoculation

¹ I translate the German word Iodin by iodia, to distinguish it from the English iodin.

was done by means of the platinum needle, drawing it over the surface of the agar in a longitudinal direction; over this line and all around it a layer of salves was spread so as to completely cover the line of inoculation, but leaving a ring of uncovered agar all along the edge of the dish. It was then noted whether the cultures developed at all, and if so, whether they developed only below the salve or spread to the uncovered ring of agar, or if they developed only there, and in how many days.

I. Following Koch's method, silk threads, cut into pieces of about 1 *cm* in length and then sterilized, were introduced into bouillon, which, after having been sterilized, had been impregnated with bacteria culture-solutions (*Bacterien-aufschwemmung*). Pure cultures four days old were used for this purpose. In this bouillon the threads were left from four to six hours, were then taken out, and dried in the desiccator. Of these now thoroughly dry and infected threads, some were preserved in a sterilized dish to serve as comparison threads (*Controllfaden*), the others were imbedded in the various salves, eight to ten threads for each salve. They were removed from the salve successively after one, two, four, and eight days, one at a time. This one was lifted out of the salve with the sterilized platinum needle, and the salve was carefully removed by means of petroleum ether (*Prof. Tavel's method*). This was very satisfactory, and I encountered none of the difficulties which Bach¹ describes. It was done in the following manner: The thread was removed from the salve with the carefully sterilized platinum needle; was introduced into an empty sterilized test-tube; the petroleum ether was poured in, the cotton plug replaced, and the tube well shaken for about half a minute. With the loop of the sterilized platinum needle the thread was then extracted and put into a test tube containing nutrient liquid gelatine. This was gently shaken, so as to avoid the formation of air bubbles, was then placed in a nearly horizontal position, and when the gelatine had stiffened was placed in the gelatine-incubator (*Gelatineschrank*) to be examined daily during a week.

¹ Bach, Ludwig, *Arch. für Ophthalmologie*, 1894, Bd. xl., Abtheilung 3.

The threads which had been put aside in order to serve for comparison were treated with petroleum ether in exactly the same manner as before, being immersed in the gelatine.

The following tables show the result of these examinations:

TABLE I.
INOCULATION ON AGAR IN PETRI'S DISHES.

	Pyocyaneus.	Bac. Coli.	Staphylococcus aureus.
Comparison threads.....	g. m. col.	g. m. col.	g. m. col.
Vaseline.....	g. m. col.	g. m. col.	g. m. col.
Bor., 4 %.....	g. m. col.	m. col.	m. col.
Hydrarg. oxid. flav., 2 %.	m. col.	—	v. few col.
Airol, 5 %.....	g. m. col.	few col.	g. m. col.
Airol, 10 %.....	few col.	few col.	g. m. col.
Aristol, 5 %.....	g. m. col.	g. m. col.	m. col.
Aristol, 10 %.....	g. m. col.	g. m. col.	g. m. col.
Iodoform, 5 %.....	g. m. col.	m. col.	v. few col.
Iodoform, 10 %.....	g. m. col.	—	v. few col.
Thioform, 5 %.....	m. col.	g. m. col.	few col.
Thioform, 10 %.....	few col.	g. m. col.	few col.
Iodon, 5 %.....	v. few col.	—	—
Iodon, 10 %.....	—	—	—
Iodia, 5 %.....	—	—	—
Iodia, 10 %.....	—	—	—

g. m. col. = great many colonies (200 and more).

m. col. = many colonies (about 50 to 100).

few col. = few colonies (about 20 to 50).

v. few col. = very few colonies (less than 25).

— = no colonies.

II. Inoculated silk threads imbedded in salves and, after removal of fat, immersed in gelatine. The experiments were repeated wherever the result seemed doubtful. Liquefaction was stated only where the microscopic examination proved the presence of bacteria. I often observed partial liquefaction resulting from the presence of certain ferments; this kind of liquefaction was not mentioned here.

The development of colonies on the comparison threads was always very slow, taking place from one to eight days later than on threads having been imbedded in salves; this I supposed to result from the evaporation and consequent dryness of the germs.

The tables could not be rendered here in extenso; they prove the interesting fact, that the development of bacteria

TABLE II.

PYOCYANEUS.

Number of days the threads remained imbedded in salve.	Compari-son threads.	Vaseline.	Bor. 4 %	Hydrag. oxid. flav. 2 %	Airol. 5 %	Airol. 10 %	Aristol. 5 %	Aristol. 10 %	Iodoform 5 %	Iodoform 10 %	Thio- form. 5 %	Thio- form. 10 %	Iodon. 5 % 10 %	Iodia. 5 % 10 %
1	g. many col.	g. many col.	many col.	m. col.	m. col.	m. col.	g. m. col.	m. col.	m. col.	m. col.	g. m. col.	g. m. col.	—	—
2	m. col.	m. col.	m. col.	m. col.	m. col.	m. col.	g. m. col.	g. m. col.	—	—	m. col.	m. col.	—	—
4	m. col.	m. col.	m. col.	—	m. col.	m. col.	m. col.	m. col.	—	few col.	m. col.	m. col.	—	—
8	few col.	m. col.	m. col.	—	few col.	—	m. col.	m. col.	—	—	3 col.	—	—	—
14	—	m. col.	m. col.	—	2 col.	—	m. col.	m. col.	—	—	—	—	—	—

COLI.

1	g. m. col.	m. col.	g. m. col.	few col.	m. col.	m. col.	g. m. col.	m. col.	1 col.	1 col.	m. col.	g. m. col.	m. col.	—
2	m. col.	m. col.	m. col.	few col.	few col.	few col.	m. col.	few col.	1 col.	few col.	g. m. col.	m. col.	few 2 col.	—
4	m. col.	g. m. col.	few col.	3 col.	few col.	few col.	m. col.	few col.	2 col.	—	few col.	few col.	5 col.	—
8	few col.	few col.	—	—	v. few col.	few col.	m. col.	few col.	—	1 col.	4 col.	3 col.	4 col.	—
14	few col.	few col.	—	—	1 col.	—	v. few col.	v. few col.	—	—	1 col.	7 col.	1 col.	—

STAPHYLOCOCCUS AUREUS.

1	g. m. col.	g. m. col.	g. m. col.	m. col.	m. col.	m. col.	m. col.	g. m. col.	m. col.	m. col.	g. m. col.	g. m. col.	no. col.	—
2	m. col.	g. m. col.	g. m. col.	—	m. col.	m. col.	m. col.	g. m. col.	m. col.	m. col.	g. m. col.	m. col.	m. col.	—
4	m. col.	g. m. col.	g. m. col.	—	m. col.	few col.	m. col.	m. col.	few col.	few col.	g. m. col.	m. col.	few 1 col.	—
8	m. col.	m. col.	3 col.	2 col.	few col.	few col.	m. col.	m. col.	—	5 col.	m. col.	m. col.	v. few col.	—
14	1 col.	few col.	—	—	—	—	m. col.	m. col.	—	—	m. col.	m. col.	—	—

is diminished as well as retarded in direct proportion to the duration of the exposure to the action of the salves. For instance: pyocyaneus in airol 10%; thread imbedded in the salve one day: second day of examination, a great many colonies; third day, complete liquefaction of gelatine, which appears intensely green; thread imbedded in the salve four days: many colonies on the fourth day; liquefaction on the eighth day; thread imbedded eight days: gelatine intact after eight days, etc.

I arrive at the following conclusions:

Most of the salves here examined diminish the vitality of bacteria, but act as germicides only after days of continuous application. Though all these salves had been prepared with the same constituent (vasel. alb. purissimum), their efficiency differs greatly according to the remedy used, as is shown by the tables; the choice of the antiseptic agent appears of great practical importance, as is not only that of the excipient.¹

According to their antiseptic value, I should arrange the salves here examined in the following order, beginning with the most effective, and ending with those that showed very slight or no germicide properties:

Iodia, 5 % and 10 %	Bor., 4 %
Iodon, 5 % and 10 %	Thioform, 5 % and 10 %
Hydrargyrum oxid. flavum, 2 %	Aristol, 5 % and 10 %
Iodoform, 5 % and 10 %	Vaselinum alb. pur.
Airol, 5 % and 10 %	

The use of salves as vehicles for antiseptic remedies, as now extensively introduced, cannot be highly enough recommended. A prolonged if not continuous action of these antiseptics on the germs cannot be otherwise insured.

Experiments on germicide properties of eye salves were published by Weeks,² and by Bach.³ The conclusions reached by the latter, as well as myself, seem to prove that salves restrain, and on longer exposure prevent, the development of bacteria.

¹ *Breslauer Zeitschrift für Hygiene*, Bd. xx., pag. 195-197.

² Weeks, *ARCH. OF OPHTHAL.*, xvi., 1887, p. 375.

³ Bach, L., *Arch. für Ophthalmol.*, Bd. xl., 1894, Abtheil. 3, pag. 130-220.

HOLOCAIN IN OPHTHALMIC SURGERY; ITS SUPERIORITY OVER COCAINE; ITS THERA- PEUTIC VALUE.

BY HASKET DERBY, M.D., BOSTON.

THE new local anæsthetic, holocain, to which the writer called attention more than a year ago (*Boston Med. and Surg. Jour.*, June 3, 1897), has not yet come into very general use, judging from the little reference made to it in the medical press, as well as the indifference manifested by so many of those who have become habituated to the employment of cocaine. Believing as I do that the latter drug is in many important respects distinctly inferior to holocain, and having used the new agent almost exclusively for the past sixteen months, I have thought that a brief record of my own personal experience might not be without value.

In the operation for the extraction of senile cataract it is a most efficient anæsthetic. While not superior to cocaine in its superficial effect, it undoubtedly causes a greater degree of insensibility of the iris. Where a simple extraction is not performed and an iridectomy has to be done, we are all familiar with the start the patients may give, as well as the pain they complain of, at this stage of the operation. Under holocain, applied after the corneal cut has been made and the anterior chamber evacuated, it is my experience that the iris very generally allows itself to be seized with the forceps and excised without much if any suffering. This is a very great practical advantage. In connection with the operation of extraction, however, it is but fair to remark on the fact that the holocain does not control hemorrhage as cocaine does, and that where the latter agent is

not used we are liable to meet with a troublesome amount of bleeding.

For the removal of a foreign body from the cornea, holocain is decidedly preferable to cocaine, as it neither affects the accommodation nor enlarges the pupil, thus rendering its use possible in the case of people with a tendency to increase of ocular tension. In other operations on the cornea or iris, such as that of Saemisch for *ulcus serpens* or iridectomy for glaucoma, it is a well known fact that a degree of inflammation that prevents the absorption of cocaine will often yield to holocain, thus rendering the use of ether or chloroform unnecessary. Had cocaine alone been at our command, general anæsthesia would have been the only resort.

In the various operations on the muscles of the eye, no local anæsthetic has been found to give entire satisfaction. It can only be claimed for holocain in this connection that it is at least as efficient as cocaine, and can be used in cases where distressing constitutional symptoms have been produced by the latter.

In probing the lacrymal passage I still make a preliminary injection of cocaine, the poisonous effects of holocain, when administered internally, rendering it unsuitable for such a purpose. For the same reason no subcutaneous injection of the drug can be made. But in the numerous cases where I have used it locally and superficially I have never seen the slightest general disturbance.

To sum up, then, the advantages of holocain over cocaine :

1. It does not cause mydriasis, and may therefore be used without danger of bringing about increase of tension.
2. It does not affect the accommodation.
3. It brings about a greater degree of anæsthesia of the iris than does cocaine.
4. In cases of severe and painful inflammation which resist cocaine, holocain often proves efficient.
5. Unless swallowed or injected subcutaneously it produces no constitutional effects.
6. It has no effect on the corneal epithelium.
7. It is strongly bactericidal in its action.

Per contra, cocaine distinctly reduces the tendency to

hemorrhage, and it can be injected into the lacrymal sac, and often subcutaneously, with comparative impunity.

Such being the facts, it would certainly seem that, in the great majority of cases, holocain should supersede cocaine as a local anæsthetic in ophthalmic surgery.

A single word in regard to eucaïne, which has also been proposed as a substitute for cocaine. My opinion of its efficiency is based on the following occurrence. I had operated in January of the present year on a lady of eighty for the extraction of cataract. Holocain was used, and the operation passed off well, causing little or no pain. A month ago I undertook to remove the cataract on the second eye. My nurse, a graduate of the Infirmary Training-School, had been used to cocaine, and had never seen anything else employed at an extraction. I was pleased to be able to call her attention to the advantages of holocain, and promised her a proof of its anæsthetic value on the present occasion. Greatly to my mortification, as well as astonishment, the patient complained bitterly of the pain, and asked me after the operation why it hurt so much more than it did the first time. On my reaching home the mystery was explained. I had taken by mistake a bottle of a two-per-cent. solution of eucaïne B, and had not noticed the substitution until my return.

But I have found a possible use for holocain that, as far as I am aware, has not yet been adverted to. It is based on its bactericidal properties, which were so carefully investigated by Heinz and Schlösser (*Klinische Monatsblätter*, Jahrg. xxxv., S. 117).

If the immediate cause of corneal ulceration is, in accordance with the present theory of suppuration, the invasion of the territory by micro-organisms (Fuchs); if the *ulcus serpens* arises through infection of the cornea by organisms which give rise to a purulent inflammation (Fuchs); if so severe a remedy as the actual cautery has sometimes been efficient in bringing about a cure, why may not germicidal action be induced through milder means than the application of a high degree of heat, or the clumsy and round-about method of the subconjunctival injection of corrosive sublimate?

"On the development of bacteria," say Heinz and Schlösser (*loc. cit.*), "holocain exerts an energetic restrictive influence. A 0.1 per-cent. solution plainly retards putrefaction and fermentation; a half-per-cent. solution prevents any development of bacterial germs; multiplying fission fungi are killed by a one-per-cent. solution. One-per-cent. holocain is therefore an active antiseptic."

The use of holocain in ulcers of the cornea seemed to be sufficiently indicated by the foregoing, and I began to employ it during the past year. My observations have been limited in extent, but thus far they have gone to convince me that holocain has a therapeutic value previously unsuspected.

A middle-aged man, in good health, had been for three weeks under my care for progressive corneal ulcer. He had used pilocarpine, cocaine, atropine, fomentations, and the compressive bandage without benefit. The pain had become excessive and the process had begun to take on the character of an *ulcus serpens*. I had begun to entertain thoughts of Saemisch's operation or the application of the actual cautery. I applied holocain, which I had never before used in a similar case, with the idea of relieving the nocturnal pain. Employed at first in connection with the other remedies, it was finally used alone, an immediate improvement seeming to follow its application. In the course of ten days the cornea had almost entirely cleared and the patient was discharged. There has been no relapse.

Another patient, also a man of middle age, had been under my care since December 10, 1897, with small corneal ulcers. These were peripheric, involved but slight loss of substance, but were extremely painful and very obstinate, yielding but slowly to treatment and constantly recurring. Finally, June 12th, I applied holocain to relieve the pain. Three days later the patient was well. At a subsequent attack, he himself applied cocaine, with the result of distinctly aggravating all the symptoms. Holocain was then substituted, and the attack was cut short. In five days he was well, and has had no attack since June 21st.

My brother, Dr. R. H. Derby of New York, writes me as follows :

"In June last I had a case of purulent conjunctivitis that had been treated for three days with ice and nitrate of silver, the usual remedies. When I was called in, the conjunctival symptoms had largely abated. There was on the left cornea a central ulcer,

deep and threatening. The patient was a girl of sixteen and was found to have a leucorrhœal discharge. The secretions from the eye had been examined twice, and the diagnosis of gonorrhœal ophthalmia had been made. I was told, however, that no gonococcus had been found. It was about that time that you wrote me of the value of holocain in cases of infected corneal ulcer. I made instillations of this drug, together with atropine and occasional warm compresses of camomile. The improvement in the corneal process was very rapid and the eye shows to-day a small central corneal macula, with a vision of ten-tenths."

For the following case I am indebted to Dr. Myles Standish of Boston, in whose practice it occurred.

"Mrs. E. M. H., married, forty years old, came June 1, 1897, with two infiltrated ulcers of cornea in the right eye, pin-head in size, and at about the margin of its pupil when moderately dilated, also with a gray infiltration just below pupil in the left eye. The ulcerations failed to heal, did not greatly extend in area; for several weeks new blebs appeared in each cornea which soon became ulcers, and about February 1, 1898, the ulcers increased in size on both corneæ. Patient up to this time had been treated with some antiseptic ointments, having for their active principle either the yellow oxide or the red iodide of mercury. Had also had atropine and at times pilocarpine and hot fomentations.

About February 5th patient was put on a solution of holocain and all other treatment omitted. There was immediate improvement, and new herpetic blebs ceased to appear. Eyes steadily improved. April 4th holocain was omitted, and on April 12th the patient returned with a new ulcer on the cornea of right, which did well when holocain was resumed. This experience was repeated on two subsequent occasions, and holocain was only finally omitted on June 15, 1898.

While so brief a series of cases conveys no certain proof of the value of holocain as a therapeutical agent, it distinctly encourages additional investigations in this direction.

That holocain has its limitations, even as an analgesic, is shown by my recent experience in a protracted and most painful case of double scleritis. While cocaine had absolutely no effect, holocain caused a disagreeable, burning sensation, lasting some hours after each application, and obliging its discontinuance. Relief was only obtained by leeching the temples and the use of fomentations.

A CASE OF EXTENSIVE CHRONIC EMPYEMA OF THE FRONTAL AND ETHMOIDAL SINUSES WITH EXOPHTHALMOS; OPERATION; RECOVERY.

By ARNOLD H. KNAPP, M.D.

(With a figure on Text-Plate I.)

S. R., thirty-five years of age, came to the Dispensary of the New York Ophthalmic and Aural Institute on February 25, 1898, complaining of protrusion of his left eye and a discharge from the nose, of one year's duration.

On examination, an exophthalmos was very noticeable ; the eye not only protruded, but was displaced down and out. The upper lid was thickened and drooped, covering a soft swelling in the upper part of the orbit. Pressure on this swelling caused thick pus to appear in the left nasal passage. The mobility of the eye was restricted, the vision normal. Ophthalmoscopic examination revealed venous congestion of the retina. On examining the nose, the left middle turbinate was found hypertrophied and pressed against the septum. The middle meatus contained polypoid masses and thick offensive pus. The probe detected extensive necrosis of the ethmoidal cells. Exploratory puncture of the left maxillary antrum proved negative. The patient otherwise appeared to be in excellent health ; there was no evidence of an intracranial complication, nor of any constitutional disease.

A futile attempt was made to improve the nasal condition by removing the hypertrophic masses in the middle meatus and curetting the ethmoidal cells, but the disease was found to be too extensive, and the external operation was immediately decided upon.

On March 5th, under ether-anæsthesia, the left nasal passage was plugged posteriorly to prevent the entrance of pus or blood



Case of chronic empyema of the frontal and ethmoidal sinuses
with exophthalmos.

Photograph taken eight months after operation.

into the pharynx during the operation. The incision commencing at the external angular process was carried along the supraorbital arch to the root of the nose, and then vertically down to the internal palpebral ligament. In completing the incision down to the periosteum at the orbital margin an abscess cavity was opened, and a large quantity of very offensive pus evacuated. The finger, introduced into this opening, entered a large cavity extending deep into the orbit, limited anteriorly by a sharp rough edge of bone. The periosteum was readily elevated from the inner bony wall and what was left of the upper wall of the orbit. The soft orbital contents were then retracted, exposing the entire inner and upper walls nearly to the apex of the orbit. The frontal sinus extended across the roof of the orbit; its lower wall was extensively necrosed showing a round defect of 2.5 *cm* in diameter. After removing the remainder of this lower wall up to the supra-orbital margin which was left intact, the upper wall of the sinus could be thoroughly explored, and presented no evidence of necrosis. The structures at the inner wall of the orbit were extensively diseased; the ethmoid labyrinth consisted of a mesh-work of necrotic bone and granulations. These were carefully removed with the sharp spoon and the bone forceps, so that the defect comprehended the lower part of frontal sinus, the adjoining part of the lacrymal bone and the entire os planum of ethmoid, exposing a small area of healthy dura above, at the floor of the anterior cranial fossa. A wide opening was thus made into the nose, laying bare the entire middle meatus. As the sphenoidal cells are often affected in ethmoid disease, the anterior wall of the sphenoidal sinus was opened, but the sinus proved healthy. Finally, attention was directed to the remaining part of the frontal sinus, *i. e.*, the anterior and upper walls and the septum. The septum contained a smooth-walled perforation, freely communicating with the frontal sinus of the opposite side. The latter sinus, however, as far as could be ascertained with the probe, was not particularly affected. The posterior surface of the anterior wall of the left frontal sinus, which was quite long, and the adjoining portion of the roof, were very carefully curetted under guidance of the touch. This was the only part of the field of operation which was not accessible to direct inspection, as it is desirable for cosmetic reasons not to encroach upon the anterior wall representing the supraorbital arch and the superciliary ridge. The entire wound was packed with iodoform gauze.

The patient's recovery from the operation was speedy and uneventful. Some inconvenience was caused during the first days by swelling of the lids and conjunctiva. The nose was irrigated at regular intervals. No especial discharge, and no fever. The packing was changed on the third day, and thereafter on alternate days. The amount of packing was gradually diminished as the soft parts of the orbit rose to fill up the cavity. The exophthalmos steadily decreased. The eye was unaffected. The wound healing progressed favorably until March 22d, four days after the patient's discharge from the hospital, when an attack of facial erysipelas set in, which lasted about nine days. The wound had closed with the exception of two openings, one at the outer angle of the orbit, short and leading back, the other, and larger one, at the inner angle, leading up and back and discharging some pus. The latter was purposely kept wide open, though no bare bone could be detected. Two granulating masses were removed from the middle meatus of the nose. The outer wound closed promptly. The one at the inner angle of the orbit progressed favorably, the discharge gradually ceased, and the wound was permanently healed on July 2, 1898, almost four months after the operation.

The exophthalmos has disappeared entirely ; the eye, however, is somewhat lower than its partner. Sight, fundus, and mobility, normal. No diplopia, and no ptosis. Below the supraorbital margin, at its inner angle, there is a slightly depressed scar, causing no deformity. (See illustration, taken on Dec. 29, 1898.)

REMARKS.—This method of operating is the one advocated by Jansen. He has described eight cases operated on in this manner.¹ The line of incision permits of the elevation of the periosteum lining the upper and inner walls of the orbit, allowing the exposure of the frontal, ethmoidal, and sphenoidal sinuses. The hemorrhage after the cutaneous incision is free but readily controlled. The trochlea is detached together with the periosteum without causing any, or only, transient interference with its function. Unless the anterior wall of the frontal sinus is necrosed, no part of it need be removed which is essential to prevent any subsequent disfigurement. The frontal sinus can usually be satisfactorily dealt with from its lower and orbital surface ; this is also most advantageous as regards drainage. The ethmoid labyrinth

¹ *Arch. f. Laryngologie*, 1894, vol. i., p. 114 and following.

can be thoroughly explored, as it can only be done by way of the orbit, and properly drained by way of the nose. The sphenoidal cavity can be directly inspected. It seems to me that the establishment of perfect drainage is the important step in the entire operation. This is secured by the broad opening into the middle meatus of the nose, requiring, as in our case, the removal of the entire os planum of the ethmoid. Kuhnt¹ removes the anterior wall of the frontal sinus in the usual cases of frontal empyema, and also employs a similar, though less extensive incision along the concavity of the orbital margin at its upper and inner angle, if the sinus is small in size, as shown by transillumination, and if the lower wall of the frontal sinus or the ethmoidal cells are involved. In two cases, Nos. xiii. and xiv., which were operated on according to the latter, or the author's second, method, the anterior and lower walls of the sinus were removed, and the ethmoidal cells curetted. The wound was drained from in front. He considers a broad communication between the wound and the nose to be very undesirable because of the danger of infection from the nose. This danger of infection is, I think, exaggerated, the wound granulates rapidly, and the nasal passage can be kept comparatively clean by frequent irrigation. The deeper parts of so extensive a wound cannot be satisfactorily drained by an opening in the face. Grünwald² has suggested a similar incision and method of procedure from studies on the cadaver. He was not satisfied with the cosmetic results of the Jansen operation and prefers the method of resecting the anterior wall of the sinus.

Many* methods, associated with the names of Panas, Ogston-Luc, Czerny, Killian, Golovine, and others, have been proposed, and are being practised, for the treatment of frontal empyema. Uncomplicated cases can be cured by various ways of operating, as a study of the literature shows. It, however, must always be borne in mind that the lower wall of the frontal sinus is the one most apt to be affected, that perforation generally occurs through this wall, and that the adjoining cells of the ethmoid are frequently involved.

¹ *Entzündliche Erkrankungen der Stirnhöhlen*, 1895, p. 208 and following.

² *Die Nasenerkrankungen*, 2d edition, 1896, p. 220.

Jansen even believes that they are always involved in empyema of the frontal sinus, and that they may even be the primary focus. Hence the method which renders these regions most accessible to inspection and operative interference, and provides for the best subsequent drainage should be the one adopted.

THE PATHOLOGICAL ANATOMY OF POLYPOID TUMORS OF THE CONJUNCTIVA.

BY DR. ISCHREYT.

From the Laboratory of the Ophthalmological Clinic of Professor RAEHLMANN,
Dorpat.

Translated by Dr. COLEMAN W. CUTLER, New York.

(With a lithographic plate *Taf. III. of Vol. XXXII. of Germ. edition.*)

ELSCHNIG¹ revised the classification of the benign polypoid tumors of the conjunctiva, and adapted it to the standpoint of modern pathological anatomy. Since that time additions² have been made to our knowledge of the subject, most of the cases reported being conjunctival papillomata, a number soft fibromata and adenomata, while hard fibromata do not appear to have been observed since the publication of Elschnig's article. Ischreyt reports the following case, because it occupies a position apart from that of the above-mentioned forms.

The patient, a man of fifty-nine years, had, in the right lower fornix, near the outer angle, a pedunculated tumor, 8 *mm* long and 4-5 *mm* broad, which sprang from the conjunctiva of the orbit. The color was dark red, the surface divided into slightly prominent, irregular lobes. The consistency was thought to be firm, no note of this having been made. The tumor was supposed to have started twenty years previously, as a result of a wound caused by a fragment of iron, and to have grown extremely slowly. The patient stated that a spontaneous separation,

¹ *Arch. f. Augenheilk.*, xix., 1889, p. 63.

² *L. c.*, and Zimmermann, *Klin. Mon. f. Augenheilk.*, xxxii., p. 371.

followed by a recurrence, had not occurred, nor had there been hemorrhages. It is said that there had been marked pulsation after physical exertion, but no discomfort had been felt. There were cicatrices of an old trachoma in the conjunctiva of the tarsus.

In general, three zones were distinguishable in the tumor from centre to periphery. In the central portion, a formation of new connective tissue; in the periphery, lymphoid tissue covered with epithelium, and between these a gradual transition from one to the other. The connective tissue was firm, poor in cells, and contained many elastic fibres. There were numerous large vessels and blood spaces in the central portion, and but few nuclei, the tissue having the appearance of undergoing hyaline degeneration. Toward the periphery, spindle-shaped cells appeared, followed by round cells until the tissue became adenoid in character. The epithelium was thrown into numerous folds, some having the appearance of glands. The cylinder cells had hyaline borders at their free ends and were unusually long, especially in the furrows, where they were arranged in two layers.

In certain conjunctival folds there were finely granular masses, cells, and lumps of varying form and size, situated mostly near one another, and appearing to be transitions of one into the other. Next to cells of normal appearance with large nuclei, were those with finely granular cell body, further little masses of the same size and of a hyaline appearance, and larger masses, evidently the result of coalescence of smaller ones, and finally large, globular, hyaline, and often ruptured bodies, with concentric layers. Goblet cells were nowhere to be seen.

The fibrous basis of the tumor is of the nature of a hard fibroma, in which, according to Billroth, Eppinger,¹ and Rindfleisch,² a cavernous metamorphosis is not unusual. The folds of the mucous membrane suggest the so-called Henle's glands, and would, according to the author, be extremely suggestive if they occurred in the normal conjunc-

¹ *Handbuch der Patholog. Anat. v. Klebs*, ii., 1, p. 71.

² *Lehrbuch d. pathol. Gewebelehre*, Leipzig, 1878, p. 116 ff.

tiva. There was no formation of cysts, probably because the folds of conjunctiva were too superficial. The regressive metamorphosis is not to be wondered at if the long existence of the tumor is considered.

The author emphasizes especially the appearance of a double transformation, that of connective tissue into hyalin, and of epithelium into mucus.

In the attempt to give this tumor a name, the author would place it in the list of polypi, as understood by Eppinger (*l. c.*), "a circumscribed hyperplasia of the mucous membrane and of the submucous connective tissue," did he not prefer to drop the term polypus entirely as applied to a definite form of tumor. A substitute for this is difficult to find, as the complicated histological structure prevents the choice of a short name. The case then is one of a telangiectatic mixed tumor with new formation of firm connective tissue and of epithelium, which is the scene of a secondary hyaline and mucous degeneration. According to Virchow¹ and Eppinger,² a simple inflammatory hyperplasia may be the first stage in the development of a polyp; the traumatism, then, followed by the mechanical effect of the movements of lids and eyeball, may well have been sufficient to transform the original swelling of the conjunctiva into a pedunculated polypus.

Explanation of the Figures on Plate III.

FIG. 1.—From the peripheral portion of the tumor. *a*, section of a conjunctival fold. *b*, vessels (the blood contained in the vessels is not drawn). *c*, zone of transition. *A*, zone of lymphatic tissue.

FIG. 2.—From the central portion of the tumor. *b*, blood-vessel. *c*, connective tissue, with elastic fibres. *l*, blood spaces.

FIG. 3.—Gland-like infolding of the conjunctiva. *I*, apparent mouth. *III*, junction of two tubes.

FIG. 4.—Products of hyaline degeneration, from the conjunctival folds.

¹ *Die Krankhaften Geschwülste*, 1863, i., p. 65.

² *L. c.*, p. 226.

ABSTRACTS OF ARTICLES, NOT PREVIOUSLY
TRANSLATED, IN VOL. XXXII. (1896) OF THE
ARCHIV FÜR AUGENHEILKUNDE.

By DR. COLEMAN W. CUTLER, NEW YORK.

IV.¹—THE ETIOLOGY AND TREATMENT OF CERTAIN FORMS
OF CONJUNCTIVITIS PSEUDO-MEMBRANOSA.

By DR. ORLANDO PES

(Assistant in the Ophthalmological Clinic of the University of Turin).

THE author reviews the work that has been done in defining and classifying the different varieties of membranous conjunctivitis, reports four cases which he has observed, and discusses the nature of the Klebs-Loeffler bacillus and other similar organisms in their relation to the causation of the disease and to its treatment.

As early as 1879, Nettleship expressed the belief that while there might be differences in the clinical appearances depending on the severity of the case, the process was always the same. Sourdille concluded that all forms of membranous conjunctivitis are caused by the Loeffler bacillus, and that the intensity of the inflammation depends on the association of other microbes and on the varying virulence of the diphtheria bacillus. Valude and Van den Bergh have attempted classifications from a clinical standpoint with more or less success. The author alludes to the confusion that exists in the treatment, and agrees with Gaupillat, who states that the varying success in the treatment may be explained by the differences in the nature of the cases.

¹ The numbers correspond to the numbers of the German edition.

Coppez is said to have been the first to use antitoxin in a case of membranous conjunctivitis, a procedure imitated by many others with equal success. In all the cases referred to by the author excepting those of Darier and Sourdille where only streptococci were found, the Klebs-Loeffler bacillus was demonstrated, sometimes alone or associated with staphylococcus, streptococcus, or the diplococcus of Fraenkel. Among eleven cases there was no sign of diphtheria in other organs in four, in three there was diphtheria of the nasal mucous membrane, and in two of the larynx. Of the four cases reported by the author, the Klebs-Loeffler bacillus was present in three, while in one only the staphylococcus pyogenes albus was found after a thorough examination with inoculation and cultures. In this case the membrane disappeared a day after a moderate dose of the antitoxin, which leads the author to inquire whether the diphtheria bacillus may not have been present at an earlier period, or whether, if the staphylococcus is assumed to be the cause of the pseudo-membranous inflammation, the antitoxin was of use. The latter view seems to him more acceptable for the reason that the inflammation assumed a benign character so soon after the use of the remedy. In the three cases where the bacillus of diphtheria was present, it had an especially virulent character; one in particular being noteworthy, where the ocular symptoms were comparatively mild while the inoculation of a guinea-pig showed an exceptionally active bacillus, but of a smaller form, claimed by Martin to be benign.

The simple microscopic examination of the membrane is of no value, for the diagnosis of diphtheritic conjunctivitis and a bacteriological examination requires three days, but the author believes that the inoculation of serum should be made at once. The remainder of the article deals with the morphology of the Klebs-Loeffler bacillus and its possible relation to the xerosis bacillus which the author would call bacillus of the secretion of the Meibomian glands, and to the bacillus pseudo-diphthericus. The confusion that exists in the minds of bacteriologists regarding these questions is indicated by the numerous quotations. The author is unable

to reach any conclusion, but seems to favor the assumption of Sourdille, that for all forms of croupous conjunctivitis, a diphtheritic origin may be admitted, but he is not prepared to deny that pyogenic organisms alone may cause a pseudo-membranous conjunctivitis.

In addition to the inoculation with antitoxin, local treatment, consisting of antiseptic irrigations, should be continued as a matter of routine. The article is accompanied by a bibliography of sixty-five references.

VIII.—EXPERIMENTS ON THE ACTION OF SUBCONJUNCTIVAL INJECTIONS OF SALT SOLUTION, UPON ABSORPTION FROM THE ANTERIOR CHAMBER AND VITREOUS.

BY DR. CARL MELLINGER, BASEL.

In this article, Mellinger continues the line of investigation with which he has been occupied for some time past,¹ and produces results of considerable interest. The action of salt solution on the lymph, to which, in common with sugar, urea, and some other substances, the name lymphagogue has been given by Heidenhain, is shown by Mellinger to be available for therapeutic purposes.

An emulsion of india ink was injected into the anterior chambers of a rabbit. A salt solution of 0.75 %, 2 %, 4 %, or 10 % strength was injected beneath the conjunctiva of one eye. After six injections, preferably of the stronger solutions, the india ink had been almost entirely absorbed, while in the eye left to itself there was practically no change.

In the case of ink injected into the vitreous, the results are equally satisfactory; the stronger solutions, 4 % and 10 %, being used and a visible difference between the two eyes appearing after five to eight injections. After twenty-one injections, the eye in which the salt solution was used had become almost free from ink, while the other remained in nearly its original condition, and, by degrees, began to atrophy. After a large number of injections (forty-five in one eye), there resulted only a slight thickening of the con-

¹ ARCH. OF OPHTHAL., July, 1897, p. 416

junctiva and no cicatrization. Where too much ink had been injected, the eye became irritable, with pericorneal injection, and the ink in the vitreous was enveloped in white exudation; in such cases, it was striking how much more quickly the signs of inflammation vanished in the eye treated with injections of salt solution.

The explanation of this result is as follows: Certain crystalline substances, among which chloride of sodium stands first, withdraw water from the tissues in proportion to their molecular composition, and to the strength of the solution. If the solution is introduced beneath the conjunctiva, it enters the lymph spaces into which the channels from the interior of the eye empty, and tends to extract an excess of fluid from that organ, thereby making place for fresh nutritive material. The action of the solution is stronger in diseased than in normal tissues, according to Mellinger, and explains the success which he has observed following its use in cases of vitreous opacities. The best results have been obtained in recent cases, and especially in traumatic hemorrhage into the vitreous. Old opacities following irido-choroiditis and myopia have been less favorably affected. The conclusions are summarized in the following manner:

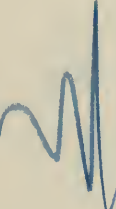
1. In the anterior chamber india ink is absorbed three to five times as quickly under the influence of subconjunctival injections of salt solutions as when left to itself.

2. Of the vitreous the same is true, but three or four times as many injections are needed as in the anterior chamber, and stronger solutions, at least 4%, are required.

IX.—THE CORTICAL PUPILLARY REFLEX OF HAAB IN ITS RELATION TO THE HEMIOPIC PUPILLARY REACTION.

BY DR. HEDDAEUS, ESSEN A. D. RUHR.

The phenomenon called by Haab cortical pupillary reflex is thus described by him. The patient sits in a dark room facing me. At his side and in front, at an angle to the visual axis of about 45°, stands a lamp burning not too brightly. He is directed to gaze before him into the dark-



ness or at my pupil or head, during which time his pupils dilate. Suddenly he is asked, "Do you see the lamp?" his attention being drawn to it without turning the eyes, and at this moment the pupils become narrow and the usual oscillation is seen. Haab claimed that this was a newly discovered reflex act, depending on the direction of the attention upon the object, and a thereby increased stimulation of the retina, transmitted to the cortex, and thence to the pupillary fibres of the oculo-motor nerve. Heddaeus asserts that the process is merely a result of an involuntary accommodation which had become relaxed during the pause, and is suddenly stimulated to action by the call upon the attention. This is indirectly a cortical process and not a reflex, for the impulse to the innervation of the three actions, convergence, accommodation, and the accompanying contraction of the iris, arises undoubtedly in the visual centre of the cortex.

When a patient with hemianopsia is examined for the hemiopic pupillary reaction by moving a light from one side to the other, we wish to ascertain whether the blind halves of the retina have lost their reflex sensitiveness with their subjective sensitiveness. We cannot prevent the patient from responding with "Haab's attention-reflex" in such cases, so that the value of the hemianopic reaction as a diagnostic sign is diminished.

X.—PARTIAL, ISOLATED PARESIS OF THE ORBICULARIS PALPEBRARUM.

BY DR. P. SILEX, BERLIN.

The histories of three cases are reported which are believed to be unique. The patients were healthy women, who suddenly, without other disorder, became affected in the following manner: The upper lid of one eye—the right in two cases, the left in one—is drawn upwards forming a deep furrow at the upper edge of the tarsus with a fulness above that. In looking upwards, forwards, or downwards there is exposed a strip of sclera $1\frac{1}{2}$ to 2 *mm* broad. The eye can be closed on rolling the eyeball upward but only by forced action of the frontalis, and even then the closure is

not complete. The lower lid appears to have its normal position and motility.

In one case, the condition disappeared in a year and a half, without treatment, and has not returned although six years have passed. The others are still under observation, and the author thinks from the analogy that the prospect for their recovery is good. The diagnosis is ingeniously established by the exclusion of Basedow's disease, spasm of Müller's muscle, and spasm of the levator palpebræ. The upper lid may also be abnormally elevated in a healthy eye when the other lid is depressed by trachoma or paralysis of the levator; also in paralysis of the rectus superior there may be overaction of the levator, but none of these conditions existed here.

Mendel,¹ Turner,² and Tooth have made it probable that the upper and lower branches of the facial nerve have different nuclei. In inferior bulbar paralysis, when the upper portion of the facial nerve was active, they found total degeneration of that group of cells in the floor of the fourth ventricle, previously thought to be the nucleus of the nerve. Experiments and clinical observation tend to show that the nucleus of the upper branch lies in the posterior part of the oculo-motor nucleus.

We are inclined to think of a paralysis of nuclear origin when only one branch of a nerve escapes or when only one is involved, but it must be remembered that an isolated paralysis of the sphincter or of accommodation is by no means always due to a nuclear lesion, but may be the remains of a peripheral, basal, oculo-motor paralysis, perhaps of syphilitic origin, in which case the prognosis for the nervous system would not be unfavorable.

In the cases under consideration, because of the recovery of one and their sudden and uncomplicated occurrence, the author is inclined to consider the lesion peripheral and of unknown nature.

¹ *Neurolog. Centralbl.*, 1881, No. 23.

² *Neurolog. Centralbl.*, 1892, S. 475.

XI.—A CONSIDERATION OF DR. AHLSTRÖM'S ARTICLE ON THE ANTISEPTIC ACTION OF THE TEARS.

BY DR. LUDWIG BACH, WÜRZBURG.

One of the most important steps in recent scientific progress is the discovery that the organism produces substances which protect it against bacterial action. This process may be called auto-disinfection of the organism, and is brought about principally by the secretions of mucous membranes and glands. Ziegler has shown that mucus will kill pus cocci and cholera spirillæ, if they are not present in too large a quantity, in twenty-four hours. And recently A. Edinger has proven that human sputum possesses important disinfecting properties, which, he asserts, depend on the presence of rhodankalium. Bach and Bernheim have attributed to the secretions of the lacrymal gland and the mucous glands of the conjunctiva the same properties.

Ahlström¹ took exception to Bach's statement, and produced evidence to show that the tears are not always active in disinfection. He attributed their variable action to the varying alkalinity, claiming that the antiseptic action is inversely as the alkalinity.

Bach, in the present article, re-establishes his position, and proves that the alkalinity has nothing to do with the case.

XVI.—TUBERCULOSIS OF THE CORNEA.

BY DR. LUDWIG BACH, WÜRZBURG.

Tubercular disease of the cornea occurs oftenest as a result of primary tuberculosis of the uveal tract and may present itself in various ways. At times, the typical appearance of parenchymatous keratitis is seen, always following the development of tubercular nodules in the ligamentum pectinatum. When there are few nodules, the keratitis probably occurs through the diffusion of toxines in the corneal tissue. In such cases the opacity of the cornea may entirely disappear. Where the primary nodules are numerous and encroach upon the cornea, the picture of parenchymatous

¹ *Centralblatt f. prakt. Augenheilkunde*, July, 1895, S. 1.

keratitis may also be produced but such nodules in the cornea are not capable of complete regression but leave opacities where the nodules had been. The clinical picture of sclerotizing keratitis may be produced if the nodules in the ligamentum pectinatum occur successively, at intervals sufficiently long to avoid the general keratitis. Very gradually, the nodule pushes forward, generally in the inner layers of the cornea, and gradually it recedes, leaving a permanent, grayish, tongue-shaped opacity. In the usual form of parenchymatous keratitis there is generally a severe iritis, but in the sclerotizing, tubercular keratitis the iris is less often affected. In recent years, the occurrence of tubercular nodules, primarily in the corneo-scleral margin, and even in the periphery of the cornea, has been observed in the Würzburg clinic. These nodules advance gradually into the cornea and heal with obliteration of the limbus at the point of eruption or leaving a tongue-shaped opacity.

Experimentally, the author has produced on the eyes of rabbits by the inoculation of tubercle bacilli exactly the same clinical appearances that had been observed in the cornea of patients. The remaining opacities and the tendency to regression were the same. If the inoculation was made near the centre of the cornea, there was a greater tendency to a superficial loss of tissue. There was little tendency to cheesy degeneration in the nodules examined. In the fresher ones, the bacilli were found, but where the nodule had regressed they were not present. There was a noticeable swelling in the neighborhood of the nodules, so that the cornea was in places double its usual thickness. There was no necrosis of the tissue around the tubercles, such as is present after inoculation with staphylococci. A moderate involvement of the iris was observed in a few cases, either of an inflammatory nature or with the development of nodules. When only one or two nodules were present in the corneal margin, the iris remained almost invariably free.

The cornea may also be involved by continuity or contiguity from a primarily diseased conjunctiva.

XVIII.—THE RELATIONS BETWEEN DISTURBANCES OF
ORIENTATION AND UNILATERAL AND BI-
LATERAL HEMIANOPSIA.

BY DR. A. PETERS, BONN.

In cases of double hemianopsia with preservation of a small central area, peculiar disturbances of orientation have been observed, consisting of weakening of the memory for places, and in loss of power to group seen objects correctly in space and to estimate their relation to each other. As yet, attempts to account for these phenomena have not been successful. The following case, with the autopsy, although the latter is lacking in detail, may, the author believes, throw some light on the subject.

The patient, a foundry-workman of sixty-eight years, with good habits and no indications of syphilis, suddenly and without previous vertigo, nausea, or headache, noticed that vision had failed, and that he was unable to make certain measurements.

On his twenty-minute walk homeward he staggered and was unable to find his way. The eyes were absolutely normal, except for a slight difference in the size of the pupils; the pupils, however, reacted normally. Vision was $\frac{2}{7}\frac{0}{0}$, and with correction of the presbyopia he could spell words in Jaeger 8, but was unable to read the simplest word, *e. g.*, the word "das" was spelled correctly, but when asked what it was, he replied, "als." He said he could see the letters, but could not bring them together.

Later, after prolonged study, he deciphered short words after many failures, but was never able to read long words. His name was written hesitatingly, but correctly. Asked to write "der," the patient said he could not bring the letters together, and then wrote "das." Separate letters were always correctly written. Memory for objects, familiar and otherwise, was variable, while for events past and present it was unimpaired; in fact, the intelligence seems not to have suffered.

The helplessness of the patient, with vision of $\frac{2}{7}\frac{0}{0}$, is striking. There is typical left hemianopsia for white and colors. The line of demarkation is vertical, with a projection of only a few degrees of good vision, around the point of fixation. The retained field is slightly narrowed concentrically. The defect of the field, how-

ever, with the diminished acuity of vision, is not enough to explain the helplessness or clumsiness of the patient. He feels his way about with outstretched hands, like a blind man. If he is asked to touch his own finger, he does it slowly and hesitatingly, whereas a blind man is able to do so promptly. The patient states that he sees the finger but does not know the place where it is. He does not attempt to supply the loss of the field by movements of the head, since the remaining portion is still quite large and contains the fixation point. The feeling or exploration of objects with the eyes, as is the rule when the field is very small, is absent; the object is quickly fixed, yet the above-mentioned symptoms are present. There are no other symptoms referable to the brain. In other organs there are signs of atheroma, tortuous and rigid radial and temporal arteries, and a soft, systolic murmur over the apex. In the urine there is neither albumen nor sugar. In the next few weeks, the disturbance of orientation increased considerably; the patient found his bed with difficulty, he saw the door clearly but reached it to open it very slowly. Six months after the first examination the retained halves of the field had become morbidly narrow, so that in the left eye, the extent to the left was 3° , to the right $21\frac{1}{2}^{\circ}$, upwards 3° , downwards 4° ; in the right eye, left 3° , right 3° , upwards 4° , and downwards 10° . Colors were correctly recognized and named. Vision was at this time slightly diminished, $\frac{2}{100}$.

Stimulated by Förster's paper,¹ I had the patient draw small figures; a circle was correctly drawn, but a square was impossible; he begins with two crossed lines and can go no farther. Simple sums are correctly solved. Topographical conceptions of things that were formerly familiar were not intact. The patient is unable to describe the road from his house to mine, he gives the streets and directions, right or left, incorrectly. In short, the disturbances described by Förster are present in the same degree. The hemianopic reaction of the pupil has not been elicited, and as yet the papillæ show no signs of atrophy.

About six months later, vision on both sides was $\frac{2}{100}$.

The field of vision: R. up, 5° ; down, 14° ; out, 15° ; in, 6° .

L. " 15° ; " 15° ; " 8° ; " 14° .

During the following year, at the end of which the patient died, the vision failed a little while the field seemed to increase slightly to the right as compared with previous examinations.

¹ *Arch. f. Ophthalmologie*, Bd. xxxvi., 1.

The autopsy, apart from œdema of the lungs and general arterio-sclerosis, showed areas of softening in the medullary layer of both occipital lobes, while the outer, cortical portions were intact. I would like to emphasize the fact that the region of the posterior cerebral commissure was involved in the left-sided area of softening, while the right-sided, larger area, extended into the cortex of the cuneus on one side, and on the other side it reached, in a small strip, under the ependyma of the left lateral ventricle. The posterior half of the thalamus was flaccid and soft.

The case, then, is similar to that of Förster,¹ which has been recently examined anatomically by Sachs,² and in regard to the double hemianopsia and the preservation of a small central portion of the field of vision, it has the same condition as those cases following Förster's article, reported by Schweigger,³ Groenouw,⁴ Vorster,⁵ Schmidt-Rimpler,⁶ and Magnus.⁷ The four cases with disorders of orientation, of Förster, Groenouw, Vorster, and Magnus, had in common the appearance of these disorders simultaneously with the occurrence of the second hemianopsia, which led to the association of these events, and to the reference of the lesion to the cortex and neighboring medullary layer, whereby the symptoms, such as loss of color, sense, and disturbances resembling soul-blindness, were easily explained. So most of the authors who have dealt with the subject of disturbances of orientation have forthwith referred them to the occipital lobes. Sachs says "that the superior association, the joining together and arranging of separate optical images which is at the bottom of the power of orientation, takes place within the occipital lobes, while recognition of objects is a function of the cortex in general, and especially of the temporal lobes and their connection with the rest of the brain." The absence of loss of orientation before the occurrence of the second hemianopsia was logically explained by the as-

¹ *L. c.*

² *Arbeiten aus der psychiatr. Klinik in Breslau*, Heft 2.

³ These ARCHIVES, Vol. xx., p. 83.

⁴ *Arch. für Psychiatrie*, Bd. xxiii.

⁵ *Allg. Zeitschrift für Psychiatrie*, Bd. xlix., S. 227.

⁶ *Arch. für Augenheilk.*, Bd. xxvi., S. 181.

⁷ *Deutsche med. Wochenschr.*, 1894, Nr. 4.

sumption that one hemisphere acted for the other and prevented further disturbance of function.

In my case, however, the condition was reversed. With the sudden development of the left hemianopsia, appeared the disorder of orientation, which remained unchanged until death, without being influenced by the second hemianopsia, either at its beginning or during its gradual regression. The left hemisphere must then be eliminated as regards its influence in compensation, improvement, or deterioration in the disturbances of orientation.

I was at first inclined to attribute to the right hemisphere a greater influence on the development of the condition than the left, but Groenouw's case showed an opposite state of affairs, the symptoms following a lesion of the left hemisphere. Both hemispheres, then, are equal in their influence, and Sachs had to assume that the absence of disorder of orientation in Förster's case depended on the vicarious action of the right hemisphere. This assumption, however, is not permissible in my case, and therefore, in my opinion, all attempts at explanation fail that would attribute the disturbance to a lesion of the cortex or neighboring medullary layer.

From the sudden appearance and irreparable character of the lesion, we cannot assume that the disease in the medullary layer of the right hemisphere alone was sufficient to abolish a function common to both hemispheres, but we must conclude that it was those parts of the right area of softening extending across the commissure, and as we cannot suppose that there is here a centre occupied solely with orientation, there remains only the assumption that here paths of association were involved which permit orientation. . . . Unfortunately, my brief notes of the autopsy are not sufficient to solve the anatomical questions, but the fact remains that the right area extended to beneath the ependyma of the left ventricle, and this portion of the lesion must be held responsible for the symptoms.

In the remainder of the article the author discusses briefly the cases to which reference has been made, mentions the results of an autopsy by Anton,¹ and a similar case of his

¹ *Neurolog. Centralbl.*, 1895, S. 955.

own, without autopsy, and closes with the postulate that the attempt to refer disturbances of orientation to the cortex or its neighboring medullary layer must be abandoned. We must rather assume that this complicated function is the result of an anatomical arrangement by which the visual impressions received by the occipital lobes are transmitted to other parts of the brain for elaboration, and disturbances arise through an involvement of fibres of association which in one place are situated close by one another.

XXII.—A COMPARATIVE INVESTIGATION OF CERTAIN THERAPEUTIC MEASURES ASSOCIATED WITH LEUCOCYTOSIS IN THE STAPHYLOCOCCUS ULCER OF THE CORNEA.

BY DR. OTTO VON SICHERER,

ASSISTANT AT THE UNIVERSITY EYE CLINIC, MUNICH.

This paper deals, first, with the history of subconjunctival injections. Von Rothmund first used a solution of sodium chloride, 4 per cent. to 12 per cent., to hasten the absorption of corneal exudations. Twenty-three years later Seconi initiated the practice of injecting solutions of corrosive sublimate, with the view that in this way an antiseptic action might be obtained in septic corneal processes. In France this method found many advocates, chief among whom Darier was most outspoken in its praise. A variety of antiseptics were tried and several theories suggested to explain their action. Mellinger was the first to deny any antiseptic action to the sublimate solution, for which he substituted salt solution with equally good effect, and Bach, among others, ended, as it seems, the controversy by demonstrating that the quantity of mercury reaching the affected area was too small to be of any therapeutic service.

The author shows, in an elaborate series of experiments, the influence of various substances on the action of the leucocytes, and quotes from the interesting work done in Buchner's laboratory to explain the properties of the latter.

An ulcer is best produced in the centre of a rabbit's cornea by the injection of one or two drops of a pure staphylococcus culture by means of a syringe and a very fine needle.

In this way a series of lesions is produced of similar intensity, thus adapted for comparative observation. The mode and development of the infection is too well known, since Leber's work on the subject, to require further mention. In the preparation of the cornea for examination the author uses, instead of xylol or zoluol, oil of turpentine, as it causes less shrinking. The following substances were used for subconjunctival injection: Sublimate, 1:1000; sodium chloride, 2:100; oxycyanate of mercury, 1:1000 and 1:500; cinna-mate of soda, 5:100; sterilized papayotin solution, 2:100. After the injection there was, in the first twenty-four hours, a noticeable and nearly equal diminution of the necrotic zone surrounding the infiltration for each of these solutions. Microscopically, the necrotic, swollen area of the cornea was more or less permeated with leucocytes, while in the control eye, which had been inoculated with staphylococci but not injected subconjunctivally, this area was free from these cells. The fact that the leucocytes were most numerous in that part of the cornea nearest to point of injection, proves that it was the cause of the increased emigration.

The significance of the emigration of leucocytes has been studied by Leber and recently by Buchner, who believes that the albuminous contents of the bacteria, the so-called "bacteria-proteins," form the attractive agents for the leucocytes; in other words, the alkali-albuminates, the first product of albuminous transformation, also plant-caseins which are closely allied to the bacteria-proteins, possess a chemotactic action. Buchner and his co-workers have made it seem probable that the bactericidal action of the blood and serum is due to the alexines which are the products of the secretion of the leucocytes, and that primarily, at least, there is no such thing as phagocytosis, as Metschnikoff used the word. The author mentions experiments made by Hahn which seem to prove these statements; and to indicate that an increased immigration of leucocytes exerts a favorable influence on infectious processes of the cornea, and that the alexines formed by the leucocytes guard the tissues against the advance of micro-organisms. Since we know, according to Pflüger, that solutions injected beneath the conjunctiva reach

the iris and the anterior chamber as well as the cornea, we may conclude that the chemotactic action is present there also, and that the leucocytes exert a peptic action, according to Leber, softening and dissolving the fibrinous exudate. Among other substances exerting a chemotactic action, is yellow oxide of mercury applied as ointment in the usual manner. Twenty-four hours after the use of this agent, an extensive leucocytosis is apparent as compared with the control eye, the zone of hyaline necrosis has diminished, and fine vessels have begun to advance from the limbus; there is a much more rapid regression of the infiltration and the absorption of the hypopyon. This chemotactic action of the yellow ointment is explained by Buchner to be due to the formation of albuminates which attract the leucocytes. After the use of the ointment, there is often in twenty-four hours a proliferation of epithelial cells on the edge of the infiltration and, as Bach has shown, a diminution of bacteria in the conjunctival sac which tends to prevent reinfection. The conclusions reached are as follows: 1. The favorable effects of subconjunctival injections as well as of yellow ointment on ulcerations of the cornea are due to the leucocytosis produced. 2. Among the solutions for subconjunctival use, 2% salt solution is to be preferred. 3. Because of its simplicity and efficiency, a protective bandage with yellow ointment, combined when necessary with cauterization, is to be recommended as the best treatment.

The bibliography contains 112 references. Finally there is an elaborate series of tables giving in detail the results of the author's experiments.

XXIII.—A CONTRIBUTION TO THE STUDY OF EPIDEMIC NIGHT-BLINDNESS.

BY DR. **SCHTSCHEPOTZEW**, IN KIEW, RUSSIA.

This disease is more prevalent in the northern parts of Russia than in the southern, and reaches its greatest intensity in the spring, which shows, according to the author, that bright light has little to do with its causation. The cold of winter can likewise play no part. Well nourished,

robust people are often affected, while not infrequently the weak, anæmic, and scorbutic escape. There have been widespread epidemics in France and Russia, in crowded centres as well as in the country, and as a rule the disease begins and ends at almost the same time of year in widely separated regions, under different conditions of weather. Night-blindness is epidemic especially in low, swampy lands and in the neighborhood of bodies of water. The author concludes from these facts that the disease is of a miasmatic nature. A statement that will bear further investigation is that the night-blind see much worse in the evening, after sunset, than in a darkened room in the daytime; even when there is more light in the former case than in the latter. A frequent though not constant symptom is dilatation and paresis of the pupils. The wide veins and narrow arteries which are said to occur, the sudden onset and disappearance in some cases following a shock, as well as the favorable results of treatment with quinine and antipyrin, lead the author to the conclusion that the anatomical basis of the disease is of a vaso-motor nature.

XXVI.—HISTORICAL REMARKS ON THE ANATOMY OF THE ORA SERRATA.

BY DR. E. BERGER, PARIS.

The author calls attention to the fact that Schön, in his article, "The Functional Diseases of the Ora Serrata and the Ciliary Portion of the Retina,"¹ neglects to give him credit for previous investigation in the same field.²

XXVII.—A CASE OF UNILATERAL LOSS OF THE PUPILARY LIGHT-REFLEX.

BY DR. L. CASPAR, MÜLHEIM-A.-RHE.

A teacher, aged thirty-eight, of healthy family, and without history of previous illness, suffered for several years from nervousness and insomnia, frequent severe headache, and occasional brief attacks of sciatica. Beer and tobacco had been used immoder-

¹ Abstracted in these ARCHIVES, July, 1897.

² *Beiträge zur Anatomie des Auges*, etc., Wiesbaden, J. F. Bergmann, 1897.

ately. No history of syphilis was obtained. The patellar reflex was absent. V R $\frac{5}{24}$ with + 2. D, L $\frac{5}{8}$ with + 1.75 D. The eyes seemed normal in all respects save for the pupillary anomaly to be described. The right pupil, with ordinary illumination, is 4 mm in diameter, the left 3 mm; with completely relaxed accommodation, the right does not change, the left dilates to 5 mm. If the eyes are covered, the left pupil remains unchanged, while the right promptly enlarges to 5 mm or more. In a strong light, as well as in accommodation and convergence, the right pupil contracts to 3 mm; consensually the reaction of the right pupil is less and slower than by direct illumination. The direct and consensual reactions of the left pupil are lost, even with the strongest illumination, but in accommodation and convergence there is a rapid contraction to 2 mm, which is more than the right eye shows. Accommodation is normal.

The explanation offered is that of Heddaeus, which assumes a lesion in the centrifugal fibres between the nucleus of the sphincter iridis and the junction with these fibres of the bundle from the nucleus of accommodation. The slow consensual reaction of the right pupil may be explained by the comparative myosis of the left eye, which admits less light, but the author assumes an extension of the process upwards and a partial involvement of the left nucleus, to account for the loss of consensual reaction on the left side and its impairment on the right side. The greater width of the left pupil may be due to the absence of reflex tone, due to interruption of the centrifugal path.

XXVIII.—ADENOMA OF THE CILIARY BODY AS CAUSE OF GLAUCOMA.

BY DR. ED. PERGENS, BRUSSELS.

In 1891, Jan V., æt. fifty-six, felt that his right eye was inflamed. Shortly before a small piece of iron had struck the eye, but probably had not penetrated. Successive attacks of glaucoma led in 1895 to enucleation.

Fontana's space was found to be obliterated, also where iridectomy had been done. In the ciliary body was found a small tumor 0.75 mm long and 0.25 mm broad, which, according to the author, must be regarded as cause of the glaucoma.

The tumor was of a tubular nature, the cells resembling the epithelium of the ciliary region. A gelatinous material was present in spaces and canals which branched and anastomosed irregularly. There were no blood- or lymph-vessels, unless the latter were represented by the canals containing the gelatinous material, but no lymph cells were found in these. Connective tissue was not present in the tumor and the muscular portion of the ciliary body was not involved.

A similar tumor, described by Badal and Lagrange,¹ is quoted by the author.

XXIX.—SARCOMA OF THE IRIS.

By DR. F. WERTHER, WARSAW.

The author collects the reports of 23 cases of primary sarcoma of the iris, which he adds to the 16 collected by Fuchs in 1882. Besides these, 2 cases that he has observed are given in detail.

In the first case, occurring in a woman aged seventy-two, the growth was 5 *mm* long and 3 *mm* broad. It involved the peripheral part of the iris, and occupied one-third of the anterior chamber, making an imprint on the lens, and pressing it backward. The sarcoma was composed of spindle cells, pigmented in its anterior portion, but in the part toward the ciliary body almost without pigment. The pigment was mostly in the cells, in places free in the finely fibrillated intercellular substance, and, in the darker half, scattered extensively in clumps. The iris, with the exception of its pupillary zone, was in places taken up by the tumor and separated from its base. The unchanged pigment layer of the iris covered the posterior surface of the tumor. The ciliary muscle, spaces of the ligamentum pectinatum, and Schlemm's plexus of veins were infiltrated with tumor cells.

In the second case, the patient, a woman aged sixty years, had noticed, a few weeks before, a brown fleck in the iris. There was seen to be a brownish-black tumor, the size of a hemp seed. After enucleation, the growth was found to have a length of 4 *mm*. It consisted of spindle cells with and without pigment. As in the first case, the iris was partly taken up by the tumor, leaving the sphincter muscle uninvolved. The median portion of the growth

¹ *Arch. d'ophth.*, t. xii., p. 143.

was deeply pigmented, the lateral almost free. Although the posterior surface was covered by the pigment layer of the iris, the sarcoma cells were free in the anterior chamber, in contact with the aqueous humor. In other respects the extension of the tumor was as in the first case.

Conheim states that 14.3 per cent. of the tumors observed in the Berlin clinic followed wounds. Boll found, in 344 cases of carcinoma, 12 per cent. to be traumatic. Fuchs attributes 11 per cent. of the 259 cases of sarcoma collected by him to a traumatic origin, and assumes that a cellular infiltration of the uveal tract, leading to hyperplasia, precedes the development of the sarcoma. Virchow states that it is but a step from inflammatory hyperplasia to sarcoma. It is known that sarcoma of the iris may develop from congenital pigmented flecks, as in the skin, after these have remained stationary for many years.

In the 23 cases collected by the author, the tumor developed 9 times between the ages of forty and sixty, 6 times before the age of thirty, and 5 times after sixty. Men were affected 8 times, women 13 times. In the majority of cases the tumor was of the spindle-celled variety.

The author states that enucleation is preferable to iridectomy in all cases, as it is impossible to tell whether the deeper parts are not already involved, as in his second case. Moreover, in the majority of cases where iridectomy had been done, a recurrence compelled enucleation later.

Statistical tables complete the article, giving the details of cases reported from 1882 to 1893.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE SECOND
QUARTER OF THE YEAR 1898.

By DR. ST. BERNHEIMER, IN VIENNA ; DR. O. BRECHT,
PROF. R. GREEFF, PROF. C. HORSTMANN, AND PROF.
P. SILEX, IN BERLIN ;

WITH THE ASSISTANCE OF

DR. G. ABELSDORF, Berlin ; DR. SWAN M. BURNETT, Washington ; DR. DALÈN,
Stockholm ; DR. HERRNHEISER, Prague ; Prof. HIRSCHMANN, Char-
kowsky ; DR. KRAHNSTÖVER, Rome ; DR. P. VON MITTELSTÄDT,
Metz ; Prof. DA GAMA PINTO, Lisbon ; DR. RICH-
ARD SCHWEIGGER, Berlin ; DR. SULZER,
Paris ; DR. L. WERNER, London ;
DR. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

Sections I.—III. Reviewed by PROF. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

141. GREEFF. An introduction to the microscopic examination of the eye. Berlin, 1898, A. Hirschwald.

142. BAAS. The visual and pupillary tracts. Charts for ophthalmic instruction. Edited by H. Magnus. Part xiv. Breslau, 1898, Kern.

143. HERRNHEISER. The myopic eye. Charts for ophthalmic instruction. Part vi. Breslau, 1898, Kern.

144. FELSCH. The ophthalmology of Alcoatom (1159), now first translated into German and annotated. *Inaug. Dissert.*, Berlin, 1898.

145. HIRSCHBERG. Blindness in Spain. *Deutsche med. Wochenschr.*, 1898, No. 23.

146. WIDMARK. Reports from the eye clinic of the Caroline Medico-chirurgical Institute in Stockholm. Vol. i. Jena, 1898, G. Fischer.

147. REPORTS FROM THE ST. PETERSBURG OPHTHALMIC INSTITUTE. Vol. v. St. Petersburg, 1896.

148. BOCK. Seventh report of the ophthalmic division of the hospital at Laibach, 1897.

GREEFF (141) in his small volume gives an excellent introduction to the microscopic examination of the eye. He describes, first, the necessary utensils, the obtaining of material, the study of fresh tissues, and the various hardening methods. He passes then to preparation, imbedding, and staining methods, and to injection, decalcification, and bleaching. In conclusion he treats of the preservation of the eyeball, and microscopic sections. The work is, for those who are concerned with the microscopic study of the eye, of valuable and almost indispensable assistance.

BAAS'S (142) two charts represent the anatomico-topographical relations of the visual and pupillary tracts, with explanatory text.

HERRNHEISER'S (143) eight charts, with text, give a comprehensive representation of the myopic eye. The figures are drawn from microscopic sections of eyes with staphyloma posticum, and from the fundus in life.

According to FELSCH (144) the writings of Alcoatim, a Spanish Arab, are of great importance in studying the ophthalmology of the middle ages, since writings of this period are few.

HIRSCHBERG (145) reports on the frequency of blindness in Spain. The most frequent causes are blennorrhœa, smallpox, and trachoma. The last disease is found least in the north of Spain, more in the central provinces, and in the eastern and southern regions with great frequency.

The reports from the Stockholm eye clinic (146) comprise the following titles: Widmark, "On the location of the papillo-macular bundle," "Statistical studies on myopia," and "On the limits of the visible spectrum to the violet side"; Dalèn, "Experimental studies on the disinfection of the conjunctival sac"; Hellgren "On the mechanical and therapeutic treatment of trachoma"; Widmark, "The operative treatment of unripe and partially stationary cataracts."

The reports from the St. Petersburg eye clinic (147) comprise tables of the out-patients seen in the years 1892-1894, respectively 18,036, 18,384, and 19,229, and of the in-patients, respectively 1,075, 1,027, and 1,113, prepared by Schroeder, Hermann, Wegert, and Blessig.

BOCK (148), in 1897, treated 914 eye patients and made 206 operations, among them 81 cataract operations, 65 iridectomies, 7 squint operations, and 14 enucleations.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

149. V. HIPPEL, E., Jr. Pathologico-anatomical changes in the eyes of the new-born. *Graefes Archiv*, xlv., p. 313.

150. PICAT. Experimental researches on the inoculation of micro-organisms into the anterior chamber of the rabbit's eye. *Arch. d'ophth.*, xviii., No. 6, p. 341.

151. SCHANZ. The pseudo- and the true diphtheria bacilli. *Wiener med. Presse*, 1898, Nos. 28 and 29.

152. AXENFELD. In how far is the so-called xerosis bacillus of the conjunctiva identical with the Hoffmann-Loeffler pseudo-diphtheria bacillus of the throat? *Berliner klin. Wochenschr.*, 1898, No. 9.

153. SCHANZ. On the pathogenic quality of the Loeffler diphtheria bacillus. *Deutsche med. Wochenschr.*, 1898, No. 33.

154. SCHANZ. The value of the statistics as to the serum therapy of diphtheria. *Therap. Monatbl.*, Sept., 1898.

155. LESTER and GOMEZ. Sleep in relation to diseases of the eye. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

HIPPEL (149) describes the retinal hemorrhages in the new-born, the breaks in Descemet's membrane, and coloboma of the optic nerve with cysts in the retina.

PICAT (150), by the injection of pure cultures of pyogenic and of innocent micro-organisms into the anterior chamber of rabbits, sought to determine the action of the antiseptic aqueous and the matter of phagocytosis. Both these play a more important rôle than has been suspected. The aqueous destroys, for example, the anthrax bacillus. The symptom-complex characteristic of the action of a micro-organism varies according to the virulence of the micro-organism and the resistance of the animal, but not according to the quantity of injected micro-organisms.

Some micro-organisms produce a distinctive panophthalmitis, some a curable irido-cyclitis, some a pseudo-tuberculous iritis, and some no disease at all. In most of his experiments, general infection took place, and thus the second eye became diseased, in some cases, like the first. v. MITTELSTÄDT.

According to SCHANZ (151), the pseudo-diphtheria bacillus is identical with the true diphtheria bacillus, but from some cause it produces a more virulent toxin.

AXENFELD (152) regards the two as different varieties of the same family.

Proceeding upon the fact that during sleep the amount of blood in the brain and eye is diminished, those authors (155) consider sleep a valuable therapeutic agent, particularly in forms of intraocular inflammation. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

156. SNEGIREW. On the influence of holocain on diffusion from the conjunctival sac into the anterior chamber. *Wjest. Ophth.*, xv., 3, p. 260.

157. WICHERKIEWICZ. My experience with protargol. *Die Ophth. Klinik*, 1898, No. 18.

158. WICHERKIEWICZ. Xeroform in ophthalmology. *Wochenschr. f. Ther. u. Hygiene d. Auges*, 1898, No. 32.

159. WICHERKIEWICZ. Further reports on xeroform. *Ibid.*, No. 49.

160. EBERSON. On the use of ichthyol in eye diseases. *Klinisch. therap. Wochenschr.*, 1898, No. 18.

161. WOLFBURG. Ichthyol and ichthalbin in ophthalmology. *Wochenschr. f. Ther. u. Hygiene d. Auges*, No. 18.

162. WINSELMANN. On eupthalmin. *Zehender's klin. Monatabl.*, xxxvi., p. 253.

163. PANAS. On oily collyria. *Arch. d'ophth.*, xviii., 6, p. 337.

164. SCRINI. Oily collyria. *Thèse de Paris*, 1898.

165. LUKER. Thiosinamine. A clinical contribution to its study. *Ophth. Record*, May, 1898.

166. MULLEN. The use of suprarenal capsule in minor eye surgery. *Ophth. Record*, June, 1898.

167. KYLE. Aqueous extract of suprarenal capsule in ophthalmic practice. *Ibid.*, April, 1898.

168. HEGG. A simple instrument for the determination of the far point in high degrees of myopia. *Zehender's klin. Monatsbl.*, xxxvi., p. 179.

169. ZEHENDER. A goniometer for the exact measurement of the angle of deviation in squinting eyes. *Zehender's klin. Monatsbl.*, xxxvi., p. 184.

170. DERBY, R. H. A modification of the stereoscope. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

171. STEVENS. Same new methods of examination of the positions of the vertical meridians of the retina. *Ophth. Record*, May, 1898.

172. JACKSON. New tests for simulated monocular blindness. *Philada. Med. Jour.*, Apr. 16, 1898.

173. BREWER, E. P. The torsionmeter—an instrument for the study of the retinal meridians. *Ophth. Record*, May, 1898.

174. VALUDE and DUCLOS. Section of the iris angle. *Ann. d'ocul.*, cxix., p. 98 and p. 241.

SNEGIREW'S (156) experiments on rabbits' eyes were according to the colorimetric method of Bellarminoff. He instilled 1 % solution of holocain into the eye, following it with fluorescein, and found that the holocain favored diffusion. Comparative experiments with cocaine 2 and 4 % showed that the action of holocain was twice as great as that of cocaine. The author therefore advises replacing cocaine as an adjuvant to solutions of atropine, eserine, etc., by holocain, particularly in cases of increased tension.

HIRSCHMANN.

According to WICKERKIEWICZ (157), in acute catarrhal or granular inflammations, and in corneal ulcers protargol is less efficacious than other drugs, but in affections of the tear sac and in blennorrhœa it is of value.

WICKERKIEWICZ (158), uses xeroform as a dusting powder, and in a 5-10 % ointment for eczema of the lids and conjunctival inflammations, and as an antiseptic after operations. It is of advantage also in corneal ulcers.

EBERSON (160) used 50 % ichthyol solution in cases of trachoma, and found that the course of the disease was shortened, and a smooth healing brought about. It is useful in conjunctival inflammations, with or without corneal complications.

WOLFFBERG (161) gave ichthalbin in 0.5 gramme doses 3 times daily to 40 patients with glaucoma and iritis, and found that the action of the other therapeutic agents used was intensified.

PANAS (163) has replaced the aqueous solutions of the usual alcaloids, by solutions of their bases in olive oil that has been previously heated. Such solutions keep better and are sterile.

V. MITTELSTÄDT.

SCRINI (164) finds that olive oil, vaselin oil, and arachnis do not irritate the conjunctiva while many other oils do. Oily solutions of the alcaloids are preferable to aqueous solutions, decomposing less readily, remaining sterile, and in the case of cocaine not drying the surface of the cornea.

SULZER.

LUKER (165) gives, in this paper, an experience with thiosinamine—a product of mustard-seed oil,—which has been exciting attention among dermatologists lately. He has used it in two cases of choroiditis exsudativa, he thinks, with much benefit, and also in cases of corneal opacity. Its diuretic action is marked. It should be given in capsule form gradually increased from 1 to 3 grains a day.

BURNETT.

MULLEN (166) has used extract of suprarenal capsule in conjunction with cocaine in obtaining anæsthesia and anæmia of the conjunctiva in operation for pterygium and in tenotomies with most gratifying results. He uses Armour's preparation of the capsule, grs. v. ad $\frac{3}{4}$ j of cold water. A drop is put in 10 minutes after the 5 % cocaine solution has been used. The anæmia is most pronounced ; there is no danger, and the healing is happy.

BURNETT.

KYLE (167) has had an experience of more than a year in the local use of the aqueous extract of suprarenal capsule in eye diseases, and is most highly pleased with the results. He finds it of great value as an astringent, and anæsthetizer in connection with cocaine. He uses it in a 2 % to 4 % solution of the extract. It contracts the walls of the blood-vessels, in the normal and inflamed conjunctiva, and he has used it with advantage in acute and chronic conjunctivitis, trachoma, panophthalmitis, iritis, lacrymal inflammation, and keratitis. He has never found any ill effects whatever, from its use, even for a considerable time.

BURNETT.

The modification of the stereoscope which DERBY (170) offers consists in a white card on which horizontal and vertical lines are drawn making spaces 1 cm square. These are numbered from

the centre, right and left, from 1 to 9. Vertically letters are used to indicate the squares. In front of this the half objects are moved by suitable screws laterally and vertically as may be required for their fusion, and arrangements are also made for the inclination of the test objects for examining the oblique muscles.

BURNETT.

The detection of abnormal leaning of the vertical meridians of the retina which give rise to strain in the effort to bring them into a proper condition of parallelism is the object of these apparatus devised by STEVENS (171). One is a simple apparatus consisting of a series of Maddox rods or of properly ground prisms fitted into an ordinary trial frame. These give, when placed before the eyes, a series of horizontal lines formed of a distant point of light in case there is no abnormal tension. If there is abnormal tension the lines in one eye—or may be both—will be inclined and not parallel with those of the other eye. The amount of rotation of one set of rods necessary to bring about this parallelism is measured on a scale attached to the frame and marks the degree of abnormality. A better instrument still is a modification of the stereoscope involving the same principle which he describes in full. For the correction of these faulty inclinations he now operates on the internal and external recti, by partial section in a manner he describes in detail, but too elaborate for an abstract.

BURNETT.

The two new tests JACKSON (172) employs for the detection of simulated blindness of one eye are these: 1st. The refraction of the "bad" eye is discovered by skiascopy, and the proper glass for that eye is placed before it. Before the other "good" eye compound cylinders are placed in such a way as to give the best vision that eye has. The patient now alleges that he sees only with the "good" eye, and while he engages his attention the axis of one cylinder is, unknown to the patient, turned from its initial position, thus giving a higher degree of compound astigmatism of an entirely different kind to that which the "good" eye may have possessed. To be successful strong cylinders should be used, 4 D at least. If there is no ametropia the -4 D and $+4$ D_c can be first placed with their axes together, each neutralizing the other—a turn of one axis through 30° will produce a high mixed astigmatism, rendering vision very obscure. If the patient still sees the test letters, it is, of course, with the other "bad" eye. The other test is to have the accommodation abolished and a lens placed in

front of one eye having a focus at 20 inches, the other at 10 inches. If with both eyes open there is vision at each of these distances, respectively, there is of course vision in each eye. BURNETT.

In this paper BREWER (173) first describes an instrument of his devising for determining the amount of abnormal torsion of the eyeballs in any given case, and also the power of torsion possessed by the eyes. The apparatus consists of a series of small Maddox prisms arranged in a cell which can be turned in any desired inclination to the meridian. A pointer and scale give the amount of this turning in degrees. There is one for each eye, and through these the patient looks at a distant point of light, which is by these rods converted into lines of light. The eyes can be dissociated by means of a prism of 9Δ base in. If the lines as seen by the two eyes are parallel, there is no torsion. If they are not, torsion is present and the degree can be determined by the apparatus. A further paper is promised giving greater details of its application to the study of the various forms of heterophoria, and it promises to be a valuable instrument of diagnosis. See also the abstract of Dr. Stevens's paper on the same subject in the same number of the *Opht. Record*. BURNETT.

VALUDE (174) has modified the curvature of de Vincentiis's needle so that the small crescent stands at an angle of 135° with the straight part of the instrument. Experiments were made on the eyes of children soon after death, internal sclerotomy being done with de Vincentiis's needle, Valude's needle, and de Wecker's linear knife, and the eyes afterwards hardened and examined microscopically. Usually Schlemm's canal is opened, and the filtration angle is freed. SULZER.

Sections IV.-VII. Reviewed by DR. ST. BERNHEIMER.

IV.—ANATOMY.

175. ROLLET and JAQUEAU. Topographical anatomy of the macula. *Ann. d'ocul.*, xix., p. 431.

176. GREEFF. Ramón y Cajal's later contributions to the histology of the retina. *Zeitschr. f. Psych. u. Phys. d. Sinnesorgane*, xvi., No. 3, p. 161.

177. STUTZER. On the elastic tissue of the human eye. *Graefe's Archiv*, xlv., 2, p. 322.

ROLLET and JAQUEAU (175) examined forty human eyes, and found that the macula lutea lies from 0.5-1.5 mm below a hori-

zontal plane passing through the centre of the optic disc. The distance between the central point of the disc and the macula in the normal eye is 4 mm, but in the myopic eye it is greater.

SULZER.

STUTZER (177) has studied the elastic tissues of the eye after orcein staining, which differentiates elastic tissue. The cornea contains no elastic tissue, the sclera contains a considerable quantity, and the ciliary body is especially rich in elastic tissue, which lies about the chamber angle, and on and between the fibre bundles of the ciliary muscle.

V.—PHYSIOLOGY.

178. ROUX. Retino-retinal reflexes. *Arch. d'opht.*, xviii., 6, p. 395.

179. FUKALA. A case of rare absolute color blindness. *Zehender's klin. Monatsbl.*, xxxvi., p. 175.

180. FICK. On cone acuteness of vision and rod acuteness of vision. *Graefe's Archiv*, xlv., 2, p. 326.

181. HEINE. Physiologico-anatomical investigations on accommodation in the eye of the bird. *Ibid.*, 3, p. 469.

182. HUMMELSHEIM. On the effect of the width of the pupil on the acuteness of vision with various grades of illumination. *Ibid.*, 2, p. 357.

183. ABELSDORF. Physiological observations on the eye of the crocodile. *Arch. f. Anat. und Physiol.*, Phys. Abth. 1898, p. 155.

184. FILEHNE. The geometrico-optical illusions as after-effects of the experience gained in corporeal vision. *Zeitschr. f. Psych. u. Phys. d. Sinnesorgane*, xvii., 12, p. 15.

185. TSCHERNING. A personal observation. *Zehender's klin. Monatsbl.*, xxxvi., p. 223.

186. VALK. Does the human cornea change its radius of curvature? *The Post-Graduate*, Dec., 1897.

187. CULBERTSON. Rotation of axis of astigmatism during ophthalmometric examination. *Amer. Journ. of Ophth.*, April, 1898.

The retino-retinal reflexes described by ROUX (178) take place in the retina of one and the same eye. 1. The pigment reflex is a true reflex, illumination and shading of the eye producing a

movement of the pigment among the rods and cones, which ceases after cutting the optic nerve. The centripetal path is the optic nerve, the centrifugal passes probably from the oculo-motor nucleus through the ciliary ganglion and ciliary nerves, and is the same as that for the light reaction of the iris which also is for the same purpose. 2. The second reflex is that of the neurones represented by the horizontal cells and spongioblasts of the inner nuclear layer. The centrifugal fibres arise probably from the corpora quadrigemina, and can be followed into the inner nuclear layer, and probably respond not directly to cortical excitation, but to excitation arising in the retina. V. MITTELSTÄDT.

HEINE (181) finds that accommodation in the eye of the bird takes place in the same manner as in man, although the change in the corneal curvature may be an important factor. The usual refraction of the dove's eye is hyperopia 1.—2. D. Under electrical stimulation accommodation will rise to 12. D, and under the use of miotics to 7.—8. D. The author was able to fix one eye with accommodation paralyzed and the other in active accommodation and examine them microscopically. The conditions found proved that the muscle of accommodation, which acts as a unit, renders tense the zonula in its contraction.

VALK (186) has found that the radius of curvature of the cornea changes from time to time, and tabulates 25 cases where he has found the changes taking place in from 4 months to 4 years. In 4 cases the radius was lessened; in 21 it was lengthened. Usually the astigmatism was not materially altered, though in 1 case it was changed 2.25. D. He thinks that age has the influence of flattening the cornea. The difference he has found to range from 0.10 mm to 0.70 mm in the radius.

BURNETT.

CULBERTSON (187) has found, in some instances, the eyes to rotate on the antero-posterior axis during an examination with the ophthalmometer, causing the axis of the astigmatism to vary. It has amounted to as much as 15°, and it is usually concomitant—that is, both eyes rotate in or about. BURNETT.

VI.—REFRACTION AND ACCOMMODATION.

188. REDDINGIUS. Increased excitability of the accommodation. A study on muscular asthenopia. *Graefe's Archiv*, xlv., p. 374.

189. VAN FLEET. Atropine in the refraction room. *The Post-Graduate*, Dec., 1897.

REDDINGIUS (188) describes eight cases of so-called increased excitability of the accommodation with corresponding muscular asthenopia. The eyes were emmetropic, and orthophoria for distance existed with marked exophoria for near and asthenopia. All the patients were relieved by wearing weak concave glasses. The author believes that in such cases there is an abnormal relationship between convergence and accommodation—viz., an over-exertion of accommodation. The condition may be artificially produced by instilling weak solutions of eserine.

As a result of his experience VAN FLEET (189) sums up the question of atropine in refraction as follows : where the fitting of glasses is for the relief of defective vision or of asthenopia due to simple refractive error, atropine is seldom indicated.

BURNETT.

VII.—MUSCLES AND NERVES.

190. VIGNES. Repeated muscular advancement. *Arch. d'opht.*, xviii., 6, p. 388.

191. LEDERER. On a case of bilateral conjugate paralysis of the ocular muscles with preserved convergence. *Restitutio ad integrum. Ophth. Klinik*, 1898, 5, p. 84.

192. MEINONG. On wheel rotation, rolling, and aberration. Contribution to the theory of eye movements. *Zeitschr. f. Psych. u. Physiol. d. Sinnesorgane*, xvii., 3-4, p. 161.

193. PAYNE. Insufficiency of the ocular muscles. *Med. Record*, April 9, 1898.

194. FISHER. Bilateral abducens paralysis. *Ophth. Record*, April, 1898.

195. DUANE. When and why shall we operate in insufficiencies of the ocular muscles? *N. Y. Med. Journ.*, Jan. 4-18-25, 1898.

196. HANSELL. Recurring internal ophthalmoplegia. *Ophth. Review*, April, 1898.

To avoid the bad effects of tenotomy, VIGNES (190) advises advancement, which, in extreme cases, he repeats on the same eye rather than on the second. With a resection of 3-4 mm of tendon he obtains, according to the amount of Tenon's capsule included

in the suture, 10° – 15° or even 20° of effect; and by repeating the operation once or twice a squint of 25° – 30° has been corrected.

V. MITTELSTÄDT.

The thesis which PAYNE (193) attempts to prove in this paper is that insufficiencies of the oblique muscles are due to a difference in the refraction of the two eyes, and that they do not exist when the refraction is the same. He also contends that when the refraction is the same there is a tendency only to horizontal insufficiency, while where there is a difference in refraction there is a tendency to vertical as well as horizontal insufficiency. A number of cases are cited in proof, and several hundred cases are tabulated.

BURNETT.

FISHER (194) reports and figures an interesting case of a perfectly healthy woman who had a paralysis of one abducens thirty-seven years ago, followed by a paralysis of the other abducens beginning seventeen years ago and without any apparent cause. Both corneas are almost hid under the canthi, and the contracture of the interni is so great that the eyes cannot be pulled out under an anæsthetic. The tissues at the inner side seem matted as we find them after panophthalmitis. Pupil cannot be exposed sufficiently for an ophthalmoscopic examination.

BURNETT.

In these papers DUANE (195) discusses the question pertaining to muscular insufficiencies, largely from his own experience, and gives the histories, in more or less detail, of 19 cases in support of his conclusions. He expects the operations (tenotomies and advancements) to relieve the following conditions: 1. Any disfiguring deflection of the eyes and the often annoying diplopia that such a deflection may give rise to. 2. Pain, in using the eyes and asthenopia; a sense of weariness and strain. 3. Headaches, migraine, and other reflex pains (not infrequently referred to the occiput or spine). 4. A sense of constant confusion in the head, causing aprosexia and mental hebetude and depression. 5. Vertigo. 6. Digestive disturbance, with impairment of appetite and nutrition and subnormal weight of the body. 7. Chorea (rarely).

BURNETT.

HANSELL (196) relates the histories of 4 cases of recurring paresis of the sphincter of the iris and ciliary muscle which were evidently nuclear in their origin, and for which there was no assignable cause.

BURNETT.

Sections VIII.—XII. Reviewed by Dr. SILEX.

VIII.—LIDS.

197. KÖNIGSHÖFER. On the operation for lagophthalmus. *Ophth. Klinik*, 1898, 1.

198. GÜNSBERG. Ophthalmological considerations. *Wjest. Ophth.*, 1898, 1.

199. WICHERKIEWICZ. An efficacious operative procedure for the relief of ectropium of the lower lid. *Rev. génér. d'ophth.*, 1898, p. 193.

200. STRZEMINSKI. Re-establishment of the ciliary margin in the operative treatment of entropium and of trachomatous trichiasis. *Arch. d'ophth.*, xviii., p. 241.

201. GOLDZIEHER. Fibroma of the upper lid with excessive growth of the skin and asymmetry of the face. *Centralbl. f. Augenheilk.*, xxii., p. 174.

202. FEUER. Tarsitis palpebrarum luica congenita, in an infant three months of age. *Ung. Med. Presse*, 1898, 20.

203. LAMBERT. Two cases of restoration of the eyelids by skin flap from the middle of the forehead. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

204. PRINCE. Excision of the tarsus for extreme non-cicatricial entropium of the lower lid. *Amer. Jour. of Ophth.*, May, 1898.

205. MURPHY. An unusual form of hypertrophy of the lids. *Annals of Ophth.*, April, 1898.

206. ALLEMAN. Congenital shortening of the lower lids, colobomata of the upper eyelids. *Ibid.*

KÖNIGSHÖFER (197) describes an operation for the relief of lagophthalmus which consists in cutting around the inner angle of the lids and uniting the cut edges in such a way as to secure adhesion of the canthus. In high degrees of lagophthalmus the external canthus is treated in a similar way.

In restoring the lid margin in cases of trichiasis and entropium, STRZEMINSKI (200) makes an inter-marginal incision 5 mm deep and inserts into this several bits of mucous membrane from the lip, without suturing.

V. MITTELSTÄDT.

In GOLDZIEHER'S (201) case there was found beneath the thickened skin of the upper lid a movable tumor of soft consistency, 7 cm x 5 cm x 4.5 cm. Microscopical examination showed

it to consist of pure connective tissue with a non-inflammatory hyperplasia of all layers of the skin. The condition is not to be confounded with elephantiasis.

In an infant three months of age FEUER (202) made a diagnosis of tarsitis palpebrarum luica congenita. The cartilage was particularly enlarged in the left eye, the convex margin here reaching the margin of the orbit. The lids could only be opened 5 mm and eversion of the lower lid was impossible. The infant had rhagades about the mouth, ulcers on the ears, and enlarged cervical glands. The infant soon died and the autopsy showed congenital syphilis.

HERRNHEISER.

LAMBERT (203) gives an account of two successful cases of formation of the lids at the inner canthus by a skin flap from the middle of the forehead. The cause of the removal of these portions of the lids was epithelioma. Two pictures illustrate the histories.

BURNETT.

For those cases of ectropium of an extreme degree, met with in elderly people, usually with some lacrymal trouble and not due to cicatricial contraction of the skin, PRINCE (204) takes out the entire tarsus of the lower lid. It can be done under cocain anæsthesia. He reports three cases of its successful application.

BURNETT.

The peculiarity of MURPHY'S (205) case is that the hypertrophy is limited to the upper and lower lids on the right side and to the right auricle. The increase in substance seems to consist of connective tissue. The weight of the upper lid is such that it is raised with great difficulty. The skin is slightly darker than the rest of the skin of the body. Vision is bad in both eyes: R $\frac{15}{20}$, L $\frac{10}{20}$. The patient is fifty-eight years old.

BURNETT.

ALLEMAN'S (206) case was a boy who suffered from a congenital deformity of the lids of both eyes, consisting in a marked shortening of the lower lids and a small coloboma 5 mm in breadth in each upper lid a few millimetres from the inner canthus. The lids could not be closed. No other deformity. V = $\frac{20}{20}$ in R, $\frac{20}{20}$ in L.

BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

207. ZENKER. A case of penetration of a knife blade through the conjunctiva into the floor of the orbit and retention there for twelve years without the patient's knowledge. *Zehender's klin. Monatsbl.*, xxxvi., p. 132.

208. STOMANN. A contribution to the knowledge of pulsating exophthalmus. Copenhagen, 1898.

209. TEILLAIS. On transitory or intermittent exophthalmus. *Ann. d'ocul.*, cxix., p. 423.

210. OLIVER. Exophthalmic goitre, extreme exophthalmus, and sloughing of both corneas not controlled by extensive and repeated tarsorrhaphies. Thyroid extract administered in high doses without avail. *Annals of Ophth.*, April, 1898.

211. BLAAUW. A case of intra-orbital tumor. *N. Y. Med. Jour.*, May 21, 1898.

212. WOODWARD. A case of pulsating exophthalmus ; rupture of the left carotid into the cavernous sinus ; cured. *Ibid.*, June 11, 1898.

ZENKER (207) describes the operation for the removal of the knife blade, which fortunately had not touched the eye. After the operation the eye remained free from irritation and had normal vision.

STOMANN (208) gives a résumé of 197 cases of pulsating exophthalmus, 22 of which he calls false, being due to orbital encephalocele, angioma or other vascular neoplasm. Of the 175 true cases 122 were of traumatic origin. The true cases are due to rupture of the internal carotid in the cavernous sinus and aneurism of the ophthalmic artery, the latter being much the rarer cause.

The prognosis, as to life, is good ; as to vision, poor ; spontaneous recovery is reported in 20 cases. Compression of the common carotid has definitely healed only 8 of the 53 cases so treated. Ligature of the common carotid has been successful in 54 per cent. of cases ; the mortality following this operation, however, is 10 per cent., which will probably be lowered with the employment of antiseptic methods. The author suggests ligating the internal carotid and perhaps later the external instead of ligating the common carotid at first. DALÈN.

TEILLAIS (209) reports the case of a married woman, of thirty-five, who within four years had had eight attacks of transient unilateral exophthalmus associated with menstruation. The attacks came on with a feeling of pain and tension in the region of the right eye, followed by chills, nausea, and vomiting. The protrusion of the eye reached its maximum in about ten hours, when $V = \frac{3}{4}$ with H. 1.50. After the subsidence of the attack, vision

and refraction were normal. The exophthalmus was not affected by compression of the carotid. Teillais has seen two similar cases, the exophthalmus occurring at the time of the menopause.

OLIVER'S (210) patient was a woman, of twenty-seven, affected with exophthalmic goitre to such an extent that 4 mm of the sclera was exposed above and below between the edges of the lids. There was the usual thyroid enlargement and a mitral murmur. There was limited movements of the balls and contraction of the V. F. F. for form and colors. Soon signs of corneal ulceration set in, and tarsorrhaphy was done in both eyes, and five grains of thyroid extract were given tri-daily. The cornea of both eyes were now opaque and ulcerating. Exophthalmus same. Patient left the hospital, and no further report.

BURNETT.

The tumor of the orbit removed by BLAAUW (211) was a dermoid cyst in the lower-inner portion of the right orbit; no exophthalmus. $V = 1$. It had no connection with the walls of the orbit.

BURNETT.

WOODWARD'S (212) patient was a healthy woman, of thirty-nine, who had a pulsating exophthalmus of the left eye, coming on without an injury. Compression of the left common carotid checked the pulsations and stopped the noises. $V = \frac{5}{20}$. Some retinal hemorrhages. Rest in bed and iodide were used without effect. The cornea becoming abraded, it was determined to ligate the common carotid, after which the symptoms abated but did not entirely disappear. All trouble, however, ceased after a ligation of the collateral vessels some five months later.

BURNETT.

XI—CONJUNCTIVA.

213. FRAENKEL, C. The gonococcus as a cause of diphtheritic inflammation of the conjunctiva. *Hygien. Rundschau*, 1898, p. 313.

214. VALUDE. Pseudo-membranous conjunctivitis due to the streptococcus and panophthalmitis, secondary to an infection with grippe and a complicated labor. *Ann. d'ocul.*, xix., p. 328.

215. GREEFF. Acute eye epidemics. *Berlin. klin. Wochenschr.*, 1898, No. 19.

216. WEICHSELBAUM-ADLER. An epidemic of acute conjunctivitis in Sarasdorf. *Das Oesterr. Sanitätswesen*, Wien, 1897, No. 20.

217. GROS. Autumnal catarrh and trachoma in Algeria. *Rev. génér. d'opht.*, April, 1898, p. 145.

218. SANTOS-FERNANDEZ. Purulent ophthalmia of the newborn in Cuba. *Ann. d'ocul.*, cxix., p. 293.

219. INOUE. Blennorrhœa infantum. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 108.

220. FEILCHENFELD. On the treatment of gonorrhœal ophthalmia in adults. *Deutsche med. Wochenschr.*, 1898, No. 18.

221. HOOR. Experiments with argentamin as a prophylactic against ophthalmia neonatorum. *Ophth. Klinik*, 1898, No. 3.

222. DARIER. Protargol, a specific for blennorrhœic conjunctivitis. *Ibid.*, No. 7.

223. DEBAGORIO-MAKRIEWITSCH. On the treatment of gonorrhœal conjunctivitis by constant flooding and the simultaneous application of strong solutions of nitrate of silver. *Wjest. opht.*, 1898, p. 1.

224. WOLLFBERG. On the value of formalin in the gonorrhœal conjunctivitis of adults. *Wochenschr. f. Therapie u. Hygiene des Auges*, 1898.

225. GÜNSBERG. Primary epithelioma of the bulbar conjunctiva. *Wjest. opht.*, 1898, No. 3.

226. VAN DUYSE. On a subconjunctival lipo-dermoid of the plica semilunaris. *Ophth. Klinik*, No. 6, p. 108.

227. TOCQS. Lymphangiectasia of the bulbar conjunctiva. *Ann. d'ocul.*, cxix., p. 350.

228. SCHAPRINGER. Benign cystic epithelioma (Jaquet) of the bulbar conjunctiva. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

229. GIFFORD. The diplo-bacillus of subacute catarrhal conjunctivitis. *Annals of Opht.*, April, 1898.

230. ALT. Conjunctivitis due to the diplo-bacillus of Morax-Axenfeld. *Am. Jour. of Opht.*, June, 1898.

FRAENKEL (213) in an infant one year old found on the inflamed conjunctiva a firmly attached yellowish-white membranous deposit which was found to be due to an infection with the gonococcus. No other micro-organisms were present. Four similar cases have been reported.

VALUDE (214) records the history of a patient who wore an artificial eye over an atrophic stump. After a severe labor neces-

sitating symphyseotomy and followed by puerperal fever, which took place in the course of an influenza broncho-pneumonia, the atrophic eye exhibited signs of diphtheritic conjunctivitis followed by panophthalmitis. Streptococci were found in pure culture in the sputum, the vaginal pseudo-membranes, the operation wound, the conjunctiva, and the vitreous. Valude believes that the infection of the interior of the eye took place from the conjunctiva through an old scar. SULZER.

GREEFF (215) sketches broadly the clinical picture of follicular catarrh and of trachoma, and describes the various forms of conjunctival catarrh that are caused by micro-organisms. He then calls attention to the fact that many children have innocent follicular swellings, and that the frequently reported epidemics of acute inflammation have nothing in common with trachoma, but are composed of benign cases of catarrhal inflammation.

Within five weeks WEICHSELBAUM and ADLER (216) observed 75 cases of mild epidemic conjunctivitis, 74 cases being in children. All cases recovered promptly, although only a few were treated, sublimate and nitrate of silver being used. The diplococcus of pneumonia was found constantly in the secretion.

GROS (217) has observed in Algiers an acute conjunctivitis appearing in September and October, usually becoming chronic and leading to granulations. He believes that it is not identical with trachoma, for the following reasons: 1. The affection appears at a particular season. The cornea is rarely affected. 2. Children are those most affected. 3. The infiltration of the lid comes on late, and pannus has never been observed. SULZER.

INOUE (219) means by blennorrhœa infantum, blennorrhœa appearing between the sixth day after birth and the fourteenth year, whether gonococci are present or not. The disease is frequent in Japan and seems to be acquired through the secretion of leucorrhœa or gonorrhœa in the individual himself or those of his family.

HOOR (221) uses argentamin in 3-5 per cent. solution in place of nitrate of silver, since it does not irritate and has other advantages. As a prophylactic against blennorrhœa of the new-born it has not proved successful.

DARIER (222) believes that protargol is a specific in blennorrhœa and lacks the caustic and corrosive properties of silver. Even 50 per cent. solutions may be used without fear of complications, and 5 per cent. solutions are very efficacious when the disease is on the wane.

The tumor in GÜNSBERG'S (225) case was situated at the inner angle on the bulbar conjunctiva, had existed for ten months, and was readily removed. After ten months the growth reappeared at the same point, but after the second removal it did not return. It was a typical carcinoma.

In VAN DUYSSE'S (226) patient, a girl of sixteen, a lipo-dermoid occupied the plica semilunaris. A microscopic report is given, and a description of three cases previously reported.

SCHAPRINGER (228) reports and gives illustrations of a case of tumor of the conjunctiva which he thinks the same as that described by dermatologists under the name of "benign cystic epithelioma." It was in a young woman, and situated on the bulbar conjunctiva, and about the size of a split pea. The appearance of the growth followed a slight inflammation of the tissue. On section it was found to be due entirely to proliferation of the epithelium of the conjunctiva. This layer was thickened, and there were numerous round or oval accumulations of epithelial cells in the connective tissue beneath. These cells showed a disposition to disintegrate and thin cysts were formed. BURNETT.

GIFFORD (229) gives an account of his experience clinically and pathologically with the diplo-bacillus first described by Morax as found by him in subacute and chronic conjunctivitis. He has had a number of cases in Omaha. He finds blood serum the best medium for culture, and the chloride of zinc solution the best remedy for treating the disease. Morax uses the sulphate as does the reviewer who has found the bacillus occasionally in Washington. He also found it in corneal ulcers as has Morax and others.

BURNETT.

ALT (230) has had three cases of acute conjunctivitis in which he found only the diplo-bacillus described by Morax and Axenfield, who found it only in the subacute and chronic forms of conjunctivitis. He used in treatment a 1% solution of protargol with excellent effect. BURNETT.

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

231. SALZER. On artificial replacement of the cornea. Wiesbaden, Bergmann, 1898.

232. GROENOUW. Nodular opacities of the cornea. *Graefe's Archiv*, xlv.

233. PELTESOHN. Hereditary lues and keratomalacia. *Deutsche med. Wochenschr.*, 1898, 18.

234. AUDREJEW. On hypopyon with purulent keratitis. *Inaug. Dissert.*, St. Petersburg, 1898.

235. HIRSCH. On so-called "recurrent erosion" of the cornea, and its treatment. *Prager. med. Wochenschr.*, 1898, 25.

236. v. REUSS. On recurrent traumatic erosions of the cornea. *Ibid.*, 1898, 21.

237. SCHROEDER. The clinical picture and the treatment of traumatic keratalgia and recurrent erosions of the cornea. *Wjest. ophth.*, 1898, 3.

238. JENSEN. Bullous keratitis. *Arch. d'opht.*, xviii., p. 129.

239. DE GOUVÉA. Operative treatment of adherent leucoma, and of the partial staphyloma resulting from it. *Ann. d'ocul.*, cxix., p. 360.

240. FRIDENBERG PERCY. The formation of vacuoles in corneal epithelium. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

241. ELLETT. A case of tenonitis. *Ophth. Record*, April, 1898.

242. HARLAN. Trophic keratitis with report of a case occurring in caisson disease. *Med. News*, April 16, 1898.

243. VEASEY. A case of hypopyon kerato-iritis occurring in a patient during an attack of typhoid fever. *Ophth. Record*, April, 1898.

Since the results of replacing the opaque cornea with clear cornea from animals have not been remarkable, SALZER (231) has proposed to use a shell of aluminum and glass to cover the cornea after a partial trephining. Four cases have been treated in this way, vision of $\frac{3}{20}$ having been obtained.

In GROENOUW's (232) case small round or irregular gray discrete nodules developed in the centre of the cornea, elevating the epithelium. They were stationary, and not accompanied by signs of inflammation. Microscopically a deposit was found in the substantia propria of the cornea which was apparently hyalin.

In experimental hypopyon keratitis in rabbits, caused by inoculation with cultures of staphylococci and streptococci, AUDREJEW (234) found that the pus cells came first from the region of Schlemm's canal and the vessels of the chamber angle and only later from the iris. The cornea takes part in the hypopyon only after rupture of Descemet's membrane.

In his reply to Reuss, HIRSCH (235) adds the report of two

cases of recurrent erosion of the cornea (keratitis bullosa or vesiculosa). Hirsch believes that through injury of the nerve endings in the corneal epithelium a neuritis arises with attacks of severe pain, with or without the formation of vesicles on the cornea. For treatment, besides a bandage and cocaine, Hirsch uses quinine, which he regards as a specific.

HERRNHEISER.

REUSS (236) does not agree with Hirsch, and believes that there are two forms of the disease. In the first there is a primary defect which becomes filled with new epithelium which is later mechanically loosened. In the second form there is actually recurring erosion.

SCHROEDER (237) describes cases of the same disease under the name "keratalgia traumatica." He gets speedy relief from touching the eroded spots with 2 per cent. silver solution.

HIRSCHMANN.

JENSEN (238) describes keratitis bullosa as it appears after superficial injury of the cornea—chiefly in women. The treatment consists in removal of the epithelial covering, atropine, and pressure bandage. Cocaine delays the healing. [Holocain deserves a trial.—H. K.]

V. MITTELSTÄDT.

From a histological examination and a study of the general question of epithelial degeneration, FRIDENBERG (240) arrives at the conclusion that the vacuoles observed in the corneal epithelium of staphylomatous eyes are not due to the same causes that produce epithelial disturbances in glaucoma. They are most like those found in degenerative conditions of the skin due to inflammatory processes and consequent degenerative changes.

BURNETT.

ELLETT (241) case is interesting from the fact that the tenonitis, which was double, was, so far as could be determined, idiopathic. The patient was a negro girl in otherwise good health. There was some corneal inflammation, but the end was recovery.

BURNETT.

HARLAN'S (242) patient was a man who was suffering from caisson disease. There was almost complete anæsthesia of the cornea and conjunctiva and the parts of the face supplied by the fifth nerve on the right side. There was a superficial ulcer on the cornea which spread, and there was hypopyon and iritis. The ulcer healed under treatment leaving a large and dense opacity. After discussing all the theories of neuroparalytic ophthalmia, he finally agrees with Panas that the keratitis in such

cases has its origin in an alteration in the Gasserian ganglion or in the nuclei of the fifth pair, and it is undecided whether it is of a paralytic or irritative nature, or produced through the medium of the sensitive vasomotor or special trophic nerve fibres.

BURNETT.

In the case related by VEASEY (243) the patient had passed the third week of typhoid fever when she was seized with a keratoiritis in the right eye, which went on to an ulceration of the cornea. This healed under the actual cautery and cleansing with formalin solution.

BURNETT.

Sections XIII.—XVIII. Reviewed by DR. O. BRECHT.

XIII.—LENS.

244. BLOOM, S. On retrochoroidal hemorrhage after cataract extraction. *Graefe's Archiv*, xlv., p. 184, with an appended note by SATTLER.

245. RISLEY. Complicated cataract. A clinical lecture. *Annals of Ophth.*, April, 1898.

246. DAVIDSON. Summary of cataract operations done at the N. Y. Eye and Ear Infirmary from Oct., 1896, to Oct., 1897. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

BLOOM (244) examined four eyes in which choroidal hemorrhage had followed extraction for iridectomy and found in all phlebitic or periphlebitic inflammatory processes. In one patient a pulmonary embolism led to death, and the other eye, successfully operated on seven years before, was examined for comparison and in this eye the veins were healthy.

The author therefore holds the disease of the veins to be responsible for the hemorrhage and accepts Sattler's explanation that with the passing off of the action of the cocaine, which contracts vessels, there comes on an excessive dilatation of the veins, which with the existing predisposition leads to rupture. [Choroidal hemorrhage, however, was well known before cocaine came into use.—H. K.]

In those cases of cataract which are demonstrably or supposedly complicated with disease of the inner tunics, RISLEY (245) recommends a preliminary iridectomy as the best operative procedure. The section of the iris, he thinks, has a good influence on the internal disease.

BURNETT.

During the year ending Oct. 1, 1897, there were made at the N. Y. Eye and Ear Infirmary (246) 141 operations for cataract. Of these, 75.71 % were simple; 20.71 % with iridectomy; with preliminary iridectomy, 2.87 %; prolapse of the iris in 11.32 %, which occurred usually within 2.7 days after the operation. Average immediate vision, $\frac{1}{100}$. Ultimate vision: 11. % had $\frac{2}{30}$, 25.92 % $\frac{2}{40}$, only 3.8 % less than $\frac{2}{20}$. One case of intraocular hemorrhage and two of panophthalmitis.

BURNETT.

XIV.—IRIS.

247. KLINKOWSKI. A case of foreign body in the iris. *Inaug. Dissert.*, Greifswald, 1898.

248. FAGE. Iritis in patients with ozæna. *Rec. d'ophth.*, 1898, p. 327.

249. LAGRANGE. Etiology, evolution, and treatment of tuberculosis of the iris. *Ann. d'ocul.*, cxix., p. 347.

250. DUNN. Partial bilateral irideremia; monocular multiple iridodialysis; iridic atrophy; glaucoma. *Annals of Ophth.*, April 1898.

251. BOYD, E. T. Inequality of the pupils observed at an altitude of 10,250 feet. *Journ Amer. Med. Assoc.*, Apr. 23, 1898.

A splinter had flown into the eye of KLINKOWSKI'S (247) patient ten years before, and for the last four years the eye had been inflamed. The foreign body, which lay in the iris, was not affected by the sideroscope, and after removal proved to be composed of iron oxyhydrate. There was no siderotic discoloration of the eye, whence the author concluded that the foreign body had entered the eye in this state.

In a patient aged twenty-six, healthy except for an ozæna, FAGE (248) saw a severe iritis develop without any other discoverable cause. Lowenberg's bacilli were found in the nose, in a state of pure culture. Antisepsis of the nasal cavity brought about a rapid recovery from the iritis.

SULZER.

LAGRANGE (249), by injecting cultures of the tubercle bacillus into the carotid in rabbits, produced typical miliary tuberculosis of the iris. He believes that primary iris tuberculosis in man is possible. In many cases such a tuberculosis may develop from a limited focus in the lungs or glands, which heals after having brought about the iris tuberculosis. From a clinical standpoint, all these cases must be regarded as primary iris tuberculosis.

Tuberculosis of the iris remains localized to the anterior segment of the eye, since the suprachoroidal space is protected by the ciliary muscle. The lymph spaces, however, are involved early, and this favors general infection. In rabbits, iris tuberculosis, almost without exception, gives rise to general tuberculosis. Lagrange, therefore, enucleates as soon as vision is lost.

SULZER.

DUNN (250) gives an account of extensive iridic changes in a man of thirty-five who had glaucomatous excavation in both eyes, with $V = \frac{3}{80}$ in R.; large objects in L. There was only a remnant of normal iridic tissue left in each eye, but this responded both to light and consensually. In the right there was iridodialysis below and externally. It was not possible to determine whether these changes were congenital or due to the glaucoma.

BURNETT.

BOYD (251) has observed an inequality in the size of the pupils, due to mydriasis of one, at Leadville, Colorado, which is 10,250 feet above the sea-level, so frequently that he is forced to regard it as a physiologic symptom, due to the influence of the high altitude on the central nervous system. He thinks high altitudes lead to mydriasis, and the less dilatation of the one may be due to a difference in the density of the radiating muscular fibres. He cites twenty cases.

BURNETT.

XV.—CHOROID.

252. EWETZKY. I. Further studies in intraocular sarcoma. II. Sarcoma in atrophic eyes. III. Flat sarcoma of the uveal tract. IV. Circumscribed melanotic sarcoma of the iris. *Wjest. ophth.*, 1898, 2-3.

253. GINSBERG and SIMON. A case of non-traumatic detachment of the choroid and ciliary body. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 161.

254. BERNHARD. A case of abnormal location of the macula and partial coloboma of the choroid. *Arch. f. Augenheilk.*, xxxvii., 1, p. 51.

EWETZKY (252) describes a great number of cases of intraocular tumor, many of them being uncommon forms, and the following one being of unique interest. In 1881, a patient of twenty-five presented a dark-brown, circumscribed tumor in the upper temporal portion of the iris, which had developed from a black spot observed seven years previously. In 1884, the tumor had

extended forward to the cornea and covered half the pupil. It was removed by operation, and proved to be a round- and spindle-celled melanotic sarcoma. In 1895, signs of glaucoma appeared and vision was much reduced, and tumor having been diagnosed the eye was enucleated. Examination then showed that the entire iris and ciliary body had undergone sarcomatous degeneration without any involvement of the choroid. HIRSCHMANN.

BERNHARD (254) describes, in a boy of fifteen, a low position of the macula requiring a visible depression of the line of sight in fixing an object. The optic disc lay also low down and was partially atrophic, and the normal position of the macula was occupied by a coloboma. $V = \frac{1}{2}$. The other eye also exhibited coloboma and atrophy with $V = \frac{3}{20}$.

XVI.—VITREOUS.

255. PURTSCHER. Extraction of copper splinters from the vitreous. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 129.

256. HOOR. Clinical ophthalmological observations. Free floating bodies in the vitreous. *Wiener klin. Wochenschr.*, 1898, No. 17.

257. ZENTMAYER. A case of probable remnants of the sheath of the hyaloid artery. *Annals of Ophth.*, April, 1898.

258. MARLOW. A case of persistent hyaloid artery containing blood. *Ibid.*

PURTSCHER (255) in two cases removed splinters of copper from the vitreous, in one the operation being done a week after the injury, irido-cyclitis having already set in, and obtained useful vision in both.

HOOR (256) describes the case of a man of twenty-two in whose vitreous was a bright green floating body as large as a bean and apparently attached to the retina by three filamentous processes. There was disseminate chorio-retinitis.

The anomaly described and figured by ZENTMAYER (257) consisted in a pyriform white connective-tissue mass springing from the porus opticus, extending into the vitreous upward and towards the m. l. region. In size it was $1\frac{1}{2}$ disc diameter in length and half as broad. From the lower part of the anterior surface there came a conical mass of the same appearance. This, as well as the macular edge of the main mass, was fimbriated. Two stream-

ers came forward into the vitreous—one to the temporal and one to the nasal side, the latter terminating in an oval opacity.

BURNETT.

MARLOW'S (258) patient was a girl of sixteen, in whose left eye there was a hyaloid artery passing straight from the centre of the papilla to the posterior surface of the lens, against which it flattened itself into a round disc three or four times larger than the diameter of the vessel. Marked pulsation was seen in the vessel, producing a rhythmical wavy motion along its whole length synchronous with the pulse. $V = \frac{6}{30}$; astig. + 2. 90°.

BURNETT.

XVII.—GLAUCOMA.

259. TERSON. Typical ophthalmomalacia complicated later with glaucoma. *Clinique Ophth.*, 1898, 5, p. 49.

260. PANAS and ROCHON-DUVIGNEAUD. Clinical and anatomical researches on glaucoma and intraocular tumors. Paris, 1898.

261. BERNHEIMER. On the occurrence of glaucoma in aphakic eyes. *Wiener klin. Wochenschr.*, 1898, 17.

262. TERSON and CAMPOS. Researches on the state of general arterial tension in the glaucomatous. *Arch. d'opht.*, xviii., 4, p. 209.

263. AGABABOFF. Note on the pathological lesions in an eye with secondary glaucoma. *Arch. d'opht.*, xviii., 4, p. 217.

264. PARISOTTI. False glaucoma (ophthalmic migraine). *Annal. d'ocul.*, cxix., p. 321.

265. SIDLER-HUGUENIN. The late results of treatment of glaucoma. *Beiträge z. Augenheilk.*, xxxii.

266. JACKSON. Glaucoma and the influence of mydriatics and myotics upon the glaucomatous eye. *Amer. Journ. Med. Sciences*, April, 1898.

The guiding idea which unites the various portions of PANAS'S and ROCHON-DUVIGNEAUD'S (260) book on glaucoma and intraocular neoplasms is the effort to explain the origin of the increased tension by a careful microscopic examination of eyes in which + tension existed in life.

They believe that the obliteration of the iris angle is a secondary symptom brought about through the variations in tension in the prodromal period, these changes being due to hypersecretion of ocular liquids while the exit-passages are still normal. The

hypersecretion itself is the result of a still unknown material change and not of a functional disturbance. It would appear, however, that the sclerosis of the retinal vessels plays a certain rôle in its production.

"While it is probable that as regards etiology there is but one sort of primary glaucoma, there are surely several sorts of secondary glaucoma." They take up as causes in cases of choroidal tumor, pigment embolism of the iris angle, compression of the venæ vorticosæ, the direct action of the neoplasm upon the iris angle, and the excitation of the ciliary nerves by the tumor, causing hypersecretion. SULZER.

BERNHEIMER (261) speaks of Czermak's hypothesis of the origin of primary glaucoma when the anterior chamber is shallow in the elderly, and when the anterior chamber is deep but inflammatory products lie in the chamber angle, and he reports four cases observed by himself of glaucoma in aphakic iridectomized eyes. In three of his patients, the second eye also was attacked with glaucoma, whence he concludes that the glaucoma in the aphakic eye was primary and independent of the extraction. In one case, the thickened secondary cataract in the region of the coloboma reached the cornea. Bernheimer therefore believes that in eyes predisposed to glaucoma cortical remains or post-operative thickened masses may affect the chamber angle sufficiently to bring about the attack.

Following attacks of migraine, PARISOTTI (264) observed increased tension, arterial pulsation, and concentric contraction of the visual field in a highly myopic, nervous patient twenty-five years of age. The temple and cheek are greatly reddened during the attack. The attacks are periodic, coming on in the night and disappearing with the first meal, but recurring in the afternoon and again passing off after a meal. After three months' observation no cupping of the disc had appeared. The author attributes the ocular symptoms to the migraine. SULZER.

SIDLER-HUGUENIN (265) followed the course of seventy-six private glaucoma patients of Haab's who had been watched for two years or more and arrived at conclusions similar to those described by Schweigger, these ARCHIVES, xx., p. 475. In 91.47% of inflammatory glaucomas with useful vision before operation, this vision was retained after operation. Anterior sclerotomy and miotics are much less valuable, but are useful in after treatment. In glaucoma simplex sclerotomy is but little behind iridectomy. For

hemorrhagic glaucoma the simplest treatment is the best, and sclerotomy is preferable to iridectomy ; 20 % of cures are reported. The exclusive use of miotics is insufficient in all forms of glaucoma. The author was able to find increased tension at night in ten cases and would explain in this way those cases of increasing excavation with tension apparently normal at the times of examination.

JACKSON (266) is of the opinion that mydriatics will produce glaucoma, at any age, in an eye predisposed to, or on the verge of, a glaucomatous attack. The best treatment of glaucoma called up by any cause is an iridectomy, and it should be advised always. Eserine in many cases helps, particularly where the pupil is still movable, and may be used, under observation, with an iridectomy almost certainly in reserve for a permanent cure. Several cases are given in illustration of this position. BURNETT.

XVIII.—SYMPATHETIC OPHTHALMIA.

267. GROTE. Is resection of the optic nerve a fitting operation for the prevention of sympathetic ophthalmia? *Inaug. Dissert.*, Berlin.

268. CRAIG. Sympathetic ophthalmia. Report of six cases. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

GROTE (267) collected from the records of the university eye clinic in Berlin all the cases in the years 1882-1897 in which resection of the optic and ciliary nerves had been done for the prevention of sympathetic ophthalmia, and came to the conclusion that sympathetic ophthalmia would not have followed the operation in any of the 352 cases if the resection had been done early.

CRAIG (268) gives a report of six cases of sympathetic ophthalmia which are mainly interesting from their causation. One was a penetrating wound of the ciliary region ; three wounds of the cornea associated with prolapse of the iris ; one followed a simple extraction of cataract with a prolapse of iris on the second day ; one from panophthalmitis following a perforating ulcer of the cornea. In only two cases was vision in the sympathizing eye retained, and both were perforating injuries. BURNETT.

Sections XIX.-XXII. Reviewed by PROF. GREFF.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

269. KRONHEIM. On the results of scleral puncture in detachment of the retina. *Deutsche med. Wochenschr.*, 1898, No. 18.

270. BAUKWITZ. A contribution to the knowledge of unilateral hemorrhagic retinitis. *Graefe's Arch.*, xlv., 12.

271. WARSCHAWSKY. A case of hemorrhage between the retina and vitreous. *Wjest. ophth.*, 1898, No. 3.

272. ABÁDIE. Intraocular hemorrhages in adolescents. *Ann. d'ocul.*, cxix., p. 332.

273. MCCOY and MICHAEL. Alcoholic amaurosis resulting from wood-alcohol poisoning. *Med. Record*, May 28, 1898.

274. STILLSON. Detachment of the retina. Report of five cases operated on by the multiple puncture of the sclera with the galvano-cautery. Four recoveries, one negative result. *Amer. Jour. of Ophth.*, May, 1898.

275. AMOS. Homonymous hemiopia followed by loss of vision in a case of uterine hemorrhage due to fibroid tumor. *Ibid.*, June, 1898.

KRONHEIM (269) reports on 21 cases of detachment of the retina treated in Professor Cohn's clinic by scleral puncture. Patients are first treated in the usual way with diaphoretics, atropine, bandage, and rest in bed, and when this is unavailing puncture is done. In 6 of the 21 cases the operation did not improve the condition, and in two the condition became worse. In 4 there was slight improvement, in 4 others marked improvement, and in 5 recovery.

BAUKWITZ (270) reviews the literature and adds the clinical and pathological report of a case of unilateral hemorrhagic retinitis from the clinic in Jena. In the nerve the central vein was found to be thrombosed, and the artery also showed changes thought to be primary. Enucleation was done because glaucoma followed an iritis with posterior synechiæ that came on.

In WARSCHAWSKY'S (271) case, after severe vomiting a hemorrhage occurred between the retina and vitreous in the macular region, causing vision to be reduced to $\frac{1}{8}$. In six months the hemorrhage had disappeared without leaving a trace and vision had become normal. A *résumé* of the 25 cases previously reported is appended.

HIRSCHMANN.

ABÁDIE (272) divides the intraocular hemorrhages of adolescents into the following categories :

1. The acute recurrent hemorrhages of the age of puberty.
2. The dyscrasic hemorrhages.
3. The secondary hemorrhages following chorio-retinitis,

4. The apoplectiform hemorrhages in the retina.

The last variety are almost always localized to one eye. The cause is a disturbance of the sympathetic consisting in a paralysis of the vaso-constrictor fibres. Abádie believes that a maximum dilatation of the vessels may cause a sudden hemorrhage, and on this account his therapy consists in the administration of quinine.

SULZER.

This patient (273), aged twenty-one, took 60 c.c. of Columbian spirits (wood-alcohol). Within twenty-four hours he was totally blind. At the end of two weeks there was perception of light. This improved to counting fingers close to the eyes, but nothing better a year after. There was mydriasis, atrophy of both nerves, and some excavation of the discs. Retinal arteries greatly diminished in calibre.

BURNETT.

Of the five cases reported by STILLSON (274) in which he used scleral puncture by the cautery for detachment of the retina, one was traumatic; one without a cause (refraction not given); one with $m = 2$ D; one the result of choroidal hemorrhage apparently; and one had 3 D of m . All were relieved except the case with hemorrhage.

BURNETT.

In AMOS's (275) case there was, first, a right hemianopsia complete, as a result of hemorrhage from uterine fibroma; followed later by a complete left hemianopsia accompanying another loss of blood. The centre of the visual field was finally restored. Amos thinks the phenomena due to embolism.

BURNETT.

XX.—OPTIC NERVE.

276. DE SCHWEINITZ. Partial optic-nerve atrophy and central scotomas (so-called central amblyopia) apparently due to chronic lead poisoning. *Ophth. Record*, June, 1898.

277. CLEMESHA. Peripheral neuritis, including optic neuritis following lavage of a dilated stomach. *N. Y. Med. Journ.*, June 25, 1898.

DE SCHWEINITZ (276) gives a full history of two cases of partial optic atrophy with central scotomas, in one of which, in addition to the clinical history, evidences of lead were found in the urine; in the other, not. He points out that such atrophy in lead-poisoning is rare. These atrophies are no doubt due to neuritis in some cases, as in his last one, but may come from changes caused by the lead not of an inflammatory character.

BURNETT.

In CLEMESHA's (277) case there was a double optic neuritis associated with a general peripheral neuritis in a man of forty-six, who suffered from dilatation of the stomach. The nervous symptoms followed lavage of the stomach, and the author deems the neuritis due to the action of toxins absorbed by the stomach.

BURNETT.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

278. ROMER. The conservative treatment of perforating wounds of the ball. *Zeitschr. f. prakt. Aerzte*, June 1, 1898.

279. NOBBE. The development of fungi in the vitreous after penetrating injuries; with investigations on aspergillus mycosis of the vitreous. *Graefe's Archiv*, xlv., p. 700.

280. STUTZER. A case of conjunctival tuberculosis following a dog's bite. *Beiträge z. Augenheilk.*, xxx.

281. WICHERKIEWICZ. On foreign bodies in the lens. *Centralbl. f. Augenheilk.*, xx., April.

282. VÜLLERS. Some cases of removal of iron splinters from the eye by means of the electro-magnet. *Deutsche med. Wochenschr.*, 1898, No. 25.

283. VERMES. A successful extraction with the Hirschberg magnet. *Sitzungsbericht d. Budapester Königl. Aerztereins, Ungarische med. Presse*, 1898, No. 16.

284. OLIVER. Foreign body in anterior portion of the eye-ball for eight years. Spontaneous extrusion through the original point of entrance in the corneal membrane; vision never interfered with. *Annals of Ophth.*, April, 1896.

285. COCKS. Gunshot wound of the orbit followed by monocular blindness. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1898.

Perforating wounds of the ball (278) are to be so treated as to prevent the entrance of pathogenic micro-organisms. For this purpose the face and lids are to be thoroughly cleansed and the conjunctival sac washed out with bichloride 1:5000. Small prolapses of the iris may be returned with a spatula if possible; if not, they should be excised. Finally iodoform is to be dusted into the eye and a pressure bandage applied.

In NOBBE's (279) case of perforation of the globe with a knife, a pure culture of the aspergillus fumigatus was found in the vitreous after enucleation.

STUTZER'S (280) patient, a boy of five, was so bitten by a dog that a portion of the lower lid was torn off. The wound healed without sutures. Three months later the family noticed that the eye was red and swollen and that the preauricular gland was enlarged. An ulcer appeared at the seat of injury, and the child developed fever and failed in health. Tubercle bacilli being found in the ulcer it was thoroughly scraped and the patient recovered.

WICHERKIEWICZ (281) relates the case of a man of forty, in whose lens a piece of a gun-cap had remained for months without causing irritation or progressive opacity of the lens.

VÜLLERS (282) records four cases of successful extraction of iron splinters by means of Hirschberg's magnet. In one case the presence of the iron could be determined only with the sideroscope of Asmus.

VERMES (283) reports that, in the Jewish Hospital in Budapest, 16 extractions of iron splinters have been attempted with Hirschberg's magnet. Ten cases were successful, and in 6 useful vision was retained.

HERRNHEISER.

In OLIVER'S (284) case, a piece of metal had entered the anterior chamber eight years before, and from appearances had injured the iris. It now showed itself at the point of entrance, and was causing some irritation. It was removed under cocain with a pair of forceps. Vision had been at no time impaired.

BURNETT.

In COCK'S (285) case the ball entered the right temple, one half inch below and three-fourth inch behind the external canthus. Immediately there was excessive exophthalmos and blindness. A few days after the optic nerve was still healthy, but soon signs of atrophy appeared. In five weeks the man died, and an autopsy showed that there had been fracture of the apex of the orbit, with pressure on the optic nerve on that side. The ball was found on the posterior part of the roof of the left orbit, which, however, was not fractured.

BURNETT.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

286. PELTESOHN. Hereditary syphilis and keratomalacia. *Deutsche med. Wochenschr.*, 1898, No. 18.

287. BAAS. Syphilitic ocular changes. *Graefe's Archiv*, xlv., p. 641.

288. SAUVINEAU. Lesions of the optic nerve in hereditary syphilis. *Rec. d'opht.*, 1898, p. 274.

289. ANTONELLI. Ophthalmoscopic stigmata of hereditary syphilis. *Thèse de Paris*, 1898.

290. PLANT. Two cases of unilateral hysterical amaurosis. *Ophth. Klinik*, 1898, No. 7.

291. SORGER. Spontaneous hemorrhage from the iris and ciliary body in a patient with leukæmia. *Münch. med. Wochenschr.*, 1898, No. 35.

292. THILLIEZ. Two cases of urticarial chemosis. *Ann. d'ocul.*, cxix, p. 286.

293. KOENIGSHÖFER and WEIL. On a case of cerebral tumor. *Ophth. Klinik*, 1898, No. 10.

294. ELSCHNIG. Visual disturbances in lead poisoning. *Wiener med. Wochenschr.*, 1898, 27-29.

295. BORSCH. On a case of amblyopia and on a case of bilateral amaurosis after hematemeses. *Ann. d'ocul.*, cxix., p. 272.

296. PARISOTTI. Considerations on toxic amblyopia. *Soc. franç. d' opht.*, 1898 ; *Ann d'ocul.*, cxix., p. 381.

297. ANTONELLI. Optic neuritis and chorio-retinitis pigmentosa, following the pernicious fever of warm countries. *Rec. d'opht.*, May, 1898, p. 277.

298. HILBERT. Colored vision after influenza. *Zehender's klin. Monatsbl.*, xxxvi.

299. KOENIGSHÖFER. A case of xanthopsia. *Ophth. Klinik*, 1898, No. 6.

300. WOODS, HIRAM. Ocular symptoms in tabes dorsalis. *Ophth. Record*, June, 1898.

PELTESOHN (286) believes that the connection between keratomalacia and hereditary syphilis is not sufficiently recognized. In two cases of keratomalacia in infants, the author had surprising results from the use of mercurials.

BAAS (287) describes in detail the changes found in a number of infants' eyes.

SAUVINEAU (288) regards optic neuritis and post-neuritic atrophy as characteristic signs of hereditary syphilis, while, in opposition to Antonelli, he believes that the scleral ring stands in no relation to hereditary syphilis. The atrophic chorio-retinitis

patches and congenital retinitis pigmentosa are regarded as characteristic signs of hereditary syphilis, but the other anomalies of pigmentation are of no other significance than as stigmata of degeneration.

SULZER.

ANTONELLI (289) in his paper on the ophthalmoscopic symptoms of hereditary syphilis gives a résumé of what has previously been written, and adds new facts from his own observation. The most frequent symptoms are discoloration of the optic disc, a choroidal ring, dilatation and irregularity of calibre in the retinal veins, narrowing of the arteries, anomalies of pigmentation, hyperopia with lessened acuteness of vision, unilateral myopia, and squint.

SULZER.

Hysterical amaurosis is difficult to distinguish from simulated amaurosis. PLANT (290), therefore, would make the diagnosis hysteria only when other symptoms of this affection are found. In one of his cases, a girl of twenty-one became suddenly blind in one eye, but cutaneous anæsthesia was found. In another, a girl became blind in one eye while carrying a bucket of water on her head, but she had previously had temporary aphasia.

SORGER'S (291) patient developed a tumor of the spleen, and later his lymph glands became enlarged throughout the entire body. Later the anterior chamber of one eye became half filled with blood.

THILLIEZ (292) records two cases in which urticaria affected the eyes. In one, the patient complained that for a week she had noticed that three or four times in the day the eye suddenly became red and greatly swollen. The redness disappeared in fifteen minutes, the swelling lasted an hour. The conjunctiva became very chemotic. These attacks corresponded to attacks of general urticaria. The other patient had suffered for years with urticaria of gastro-intestinal origin, when suddenly one evening the eyes began to twitch and became red and swollen, the chemosis being so marked that the attending physician made scarifications.

SULZER.

In KÖNIGSHÜFER and WEIL'S (293) case the ophthalmoscopic signs of stoppage of the central artery appeared in one eye, and later in the other. At the autopsy a tumor as large as a hen's egg was found, which had destroyed the left optic nerve and the chiasm.

ELSCHNIG (294) describes the various sorts of ocular disturbance due to lead poisoning. Sixteen cases of ocular muscle

paralysis have been reported. No part of the visual tract seems to escape. Intraocular neuritis is frequent, retrobulbar neuritis with central scotoma less so. Spasm of the retinal vessels producing ischæmia of the retina is also met with. When the vision is failing rapidly, local treatment must be employed. If vascular spasm persists, massage should be tried, or a paracentesis done. In other forms of visual disturbance, lumbar puncture should be considered, since this relieved in a marked way the lead encephalopathies.

HILBERT'S (298) patient was a man of thirty-eight who had suffered for a month with influenza. He then had attacks of dizziness, and now all objects appear as blue as if he were looking through a blue glass. V. = $\frac{2}{3}$ each. Ophthalmoscopically, normal. The blue vision is doubtless of central nature.

KÖNIGSHÖFER'S (299) patient, a boy of thirteen, suffered from xanthopsia. The only cause discoverable was intestinal worms, and the trouble disappeared after the use of santonin.

After a general consideration of the connection between tabes and syphilis with eye affections, and especially muscular paralyses, WOODS (300) gives the history of two cases in illustration. *Case 1.*—A woman of thirty-two, left mydriasis with temporary paresis of the left ciliary, internal and inferior recti, impairment of right lev. pal. sup., and sup. rectus; later development of Argyll-Robertson pupil and tabic symptoms. *Case 2.*—A man of thirty-eight, unilateral (left) accommodative paresis, permanent. In four months rapid optic-nerve atrophy, paracentral scotoma and a year later a commencing atrophy of the left nerve, right myosis, slow development of Argyll-Robertson pupil. BURNETT.

REPORT OF THE TRANSACTIONS OF THE SECTION
ON OPHTHALMOLOGY AND OTOTOLOGY OF THE
NEW YORK ACADEMY OF MEDICINE.

By Dr. W. B. MARPLE, Secretary.

MEETING OF OCTOBER 17, 1898, THE PRESIDENT, DR. E. GRUENING,
IN THE CHAIR.

Dr. CARL KOLLER presented a family (mother and two children), all exhibiting **congenital distichiasis**. In all three there exists on each lid a second row of ciliæ besides the normal one. They spring from the free margins of the lid in front of the stomata of the Meibomian glands. The row is complete from one end of the lid to the other. The eyelashes are finer than the normal, somewhat stronger on the outer half of the lid. Their direction is parallel to the eyeball, with which they are in continual contact. In all three individuals moderate irritation owing to the brushing by the eyelashes against the globe is present, but very much less than is seen in pathological distichiasis. Koller endeavored to remove the supernumerary row of ciliæ in the elder child by electrolysis. The ciliæ returned. Later he has resorted to individual electrolysis of each hair. For the origin of this malformation, evidently a very rare one, no satisfactory explanation can be offered. Koller then made some remarks on the embryonal formation of eyelids and ciliæ.

Dr. WEBSTER said that a good plan very often is to take away the outer row and then turn the inner row out.

Dr. GRUENING said that this would depend on the kind of lashes on the inner row.

Dr. KOLLER said that the best row was in front.

Dr. W. B. MARPLE presented a case of **symblepharon**, following a burn on which he had performed **syndesmotomy**. The lower lid was adherent to globe, covering two

thirds of cornea, and the motility of the eye was greatly restricted. The case was more difficult to manage from the fact that it had already been operated on elsewhere unsuccessfully three times. The lid was dissected away from the globe, securing a fornix of normal depth and restoring normal motility. Then a glass shell was introduced and the eye bandaged. The following day a Thiersch graft from the arm was introduced over the shell and the eye bandaged. The shell was left in four days, when the patient complained of pain, and, on opening the eye, the pain was seen to be due to a corneal infiltration visible through the transparent glass of the shell, and caused by the pressure of the latter upon the cornea. The shell was then removed and the eye rebandaged. No effort was made to examine the parts till about the twelfth day, when the graft was found to have taken, and the condition to be surprisingly improved. There is quite a deep fornix, and the motility of the eye is very little restricted. There is a very small band towards the inner canthus which will be subsequently treated in a similar manner when the result promises to be most satisfactory.

Dr. T. R. CHAMBERS said he was surprised that Dr. Marple succeeded in removing the shell in four days without disturbing the graft. He had always left his in much longer.

Dr. MAY said that he had a case which he hopes to show at the next meeting. He had operated so as to enable the patient to wear an artificial eye. The result in the upper lid was beautiful ; in the lower lid it was very fair, though he had to operate several times. The globe was entirely united to the lids. Now the patient can wear an artificial eye. The operation is very tedious, and requires much patience. He had to have a large shell made to entirely fill up the space.

Dr. E. FRIDENBERG said that he had used a Thiersch graft, covering only the globe, however, and attaching graft by means of sutures. The result was good. Thought that it might be advantageous to employ this method instead of a shell, and thus avoid ulceration of the cornea.

Dr. GRUENING said that he could corroborate the description of Dr. May. The patient could now use an artificial eye nicely. Where the eye is lost there is no objection to the use of a shell.

Dr. MARPLE showed the case of **pemphigus conjunctivæ** (previously exhibited to the Section) to show the progress the disease had made.

Dr. R. DENIG showed a case of **argyriasis** in a man who had **used a five per cent. solution of protargol for four months**, instilling one drop t. i. d., although he had told patient to return in four days. The case was interesting as it had been claimed that such a result did not follow the use of this remedy.

Dr. D. WEBSTER said that protargol had been employed at the Manhattan Eye and Ear Infirmary, but that it has been given up. He has used argonin, however, in acute conjunctivitis, and it has given him better results than anything else dropped into the eye t. i. d. In one case he used it with beneficial results in a mild case of purulent conjunctivitis. In solution it keeps only a few days.

Dr. GRUENING, referring to Dr. Denig's case, asked whether we ought not to use the same precautions in the use of protargol (or argonin) as in that of nitrate of silver. If we gave the latter to a patient to use t. i. d. for several months, we would expect argyriasis.

Dr. M. L. FOSTER read a paper on **congenital irideremia** (published in full, these ARCHIVES, Nov., 1898).

Discussion: Dr. H. KNAPP said that he has seen some few cases, but never went into the details of their condition. They are remarkably free from intraocular changes, and he has seen cases where the sight was quite good. He thought that they were analogous to conus inferior, *i. e.*, coloboma of sheath of optic nerve.

Dr. HEPBURN said that some of these cases might have a good ciliary muscle with deficiently developed iris.

Dr. A. E. DAVIS said that he had seen four cases in all, one of the cases of Dr. Foster's more recently. The astigmatism has changed during the last year, possibly due to tilting up of lens.

Dr. GRUENING had recently seen a case of coloboma of the iris in a child associated with coloboma of the choroid and sheath of the optic nerve and confined to one eye.

Dr. R. DENIG had seen a family, mother and three children, with aniridia. The mother had cataract on which he had operated successfully. Dr. de Beck, of Chicago, had reported several similar cases. In some operated upon for cataract the eyes were lost from cyclitis following prolapse of vitreous.

Dr. R. DENIG read a paper on the **histology and etiology of lenticonus posterior** (with microscopical specimens). There was the complication of a total anterior cataract which was separated by perfectly normal fibres from the degenerated central

parts of the lens. There was no persistence of the hyaloid. The posterior capsule was ruptured. It is not probable that the hyaloid has anything to do with the cause of posterior lenticonus; it seems to be not its cause, but rather its effect. As to its etiology, it is probable that abnormalities in the ectoderm in foetal life produce anomalies of the lens. As regards the nomenclature, cases where the capsule has not been ruptured ought to be called lentiglobus, while the name lenticonus should be retained for cases where the capsule has been ruptured. Cases would probably be observed more frequently if the lenses were not so often cataractous.

Dr. WEBSTER referred to his case of lenticonus, the first on record, but Dr. Knapp had first made the diagnosis. The case looked like conical cornea. He sent the patient to Dr. Knapp with a note which the latter returned, having made the proper diagnosis.

Dr. KNAPP replied that the case was Dr. Webster's, his former pupil, who had been so kind as to send the patient to him. He felt convinced that Dr. Webster would have made the diagnosis himself when he saw the patient again, and therefore he had asked Dr. Webster to omit his name in the publication.

Adjourned.

BOOK NOTICES.

I. **Report on the Ophthalmic State of the Poor-Law Children in the Metropolis.** By SYDNEY STEPHENSON, Esq., M.B. London, 1897. Price 2s. 3½d.

This report, a folio of 239 pages, presented to both Houses of Parliament by command of her Majesty, is an honor to the author as well as to the British nation. It shows with what care all phases of life are dealt with in England. The book is an exposition of the health of the eyes of children, based on a systematic and extensive examination of public and private educational and eleemosynary institutions, especially the schools of the poor. It gives the percentage of diseased eyes among the inmates, the nature of the affections, in particular acute and chronic purulent ophthalmia, muco-purulent conjunctivitis (acute epidemic catarrh), trachoma, and their consequences as to damage of sight; furthermore, it describes the sanitary condition of these institutions, and recommends desirable improvements, specified for each establishment. We cannot enter into the details of the admirable and exhaustive report, but would recommend it for earnest study to the officers of similar institutions in this and other countries, as well as for the boards of managers and surgeons of ophthalmic hospitals, to whom Mr. Stephenson's labor will be a gift more useful than many received from their patrons.

H. K.

II. **Gesichtsstörungen und Uterinleiden.** Von Prof. Dr. A. MOOREN, of Düsseldorf. Zweite umgearbeitete Auflage. Wiesbaden: Bergmann, 1898.

In this edition (106 pages in octavo), enlarged by several new chapters, the author has added the result of the last seventeen years to his experience in the edition of 1881. The influence of the peculiar constitution of women on the visual organ, during

the different periods of her evolution and involution, are described in detail, and with critical remarks on the statements of other authors. These descriptions and the rules for systemic and local treatment, coming from a keen observer and most experienced clinician, will be appreciated by every ophthalmic practitioner.

H. K.

III. *Das Sideroscop u. seine Anwendung.* Von Dr. EDUARD ASMUS. Wiesbaden : Bergmann, 1898. 88 octavo pages, with four lithographic plates. M. 2.40 (\$0.60).

The object and principle of this instrument, to determine the presence and seat of iron bodies in the eye, are known to our readers. The very neatly gotten-up brochure gives a detailed description of the exceedingly delicate apparatus and the way of using it. Its publication is opportune, the instrument being a desirable supplement to the different forms of magnet, the value of which is becoming more evident from year to year.

H. K.

IV. *Über der Verwertbarkeit der Bindehaut in der practischen u. operativen Augenheilkunde* (On the Use of the Conjunctiva in Eye-Surgery). Von Dr. HERMANN KUHN, Prof. an der Univ. Königsberg. 149 large-octavo pages with twenty-two text figures. Wiesbaden : Bergmann, 1898. M. 4.60.

The fertile and versatile author introduces his monograph as follows : "The following leaves are intended systematically to present a therapeutic procedure which the writer may well consider as his mental property." It consists in covering defects in the cornea and sclera with conjunctiva, be they defects produced by ulceration, complicated, or not, with prolapses, fistulas, keratoceles, etc., by simple or complicated wounds of the sclera and cornea, or by surgical operations. His judgment and description are based on the observation of several hundred cases, treated during the last fifteen years. The indications, the rules and precautions, and the results are carefully detailed and exemplified by numerous case histories. The reviewer appreciates the observations and studies of the author, but he, as everybody, knows that scleral wounds from injuries and operations have been closed by conjunctival sutures very many years ago, and he, resting on his own experience, thinks that the necessity, nay even the advantage, of such sutures has been overrated.

The reviewer has no experience in conjunctival covering of corneal ulcers, but thinks this procedure may be of great value,

particularly in neuro-paralytic keratitis, and most chronic and unclean ulcers show absence or diminution of sensibility. In such cases the conjunctival flap may serve no worse, perhaps a better, purpose than the closure of the eye by a compressive bandage or stitching up the palpebral fissure. Kuhnt, page 9, warns us that in ulcers of the cornea a cleansing, as nearly ideal as possible, should precede the conjunctival keratoplasty. In corneal abscess K. removes the anterior wall, cleanses the ulcer, and implants a pedunculated or unpedunculated piece of conjunctiva. He wants this piece to unite permanently with the cornea, being a keratoplasty not with the same but a kindred tissue (p. 144). In cataract operations K. uses the conjunctiva : (a) when the final closure of the wound is too protracted ; (b) in prolapse of the iris by some cause or other ; (c) in infection of the flap, and its consequences.

These extracts may suffice to draw attention to the wide and, doubtless, in many respects fertile field of which the author's monograph gives such a clear, elaborate, and attractive picture. Though it may here and there be overdrawn, the cautious reader will derive great satisfaction and instruction from the multitude of important observations and practical remarks which cannot fail to leave a stimulus in his mind to test the truth of the author's assertions by repeating his work. The reviewer, although not prepared to follow the author's guidance everywhere, and rather inclined to let Nature have her own way where he has seen her do good, will certainly try a number of the author's methods.

H. K.

V. Über den künstlichen Hornhautersatz. (The Artificial Restitution of the Cornea.) By FRITZ SALZER, Munich. 65 octavo pages, with 1 plate and 13 text figures. Wiesbaden : Bergmann, 1898. M. 1.80.

The reviewer had been of opinion that keratoplasty for improvement of sight was a "dead issue," but before him is a recent serious monograph on the same subject, with a critical historical review of what has been tried and accomplished, or rather tried and failed to accomplish, in that line of work, with new experiments and a few new operative cases, none of them being anything like a success. Though the author concludes that the possibility of a permanent artificial restitution of the cornea with good optical result is not quite unobjectionably demonstrated by his observations, yet success for a number of years may be ex-

pected in well selected cases. Despite this faint hope of practical benefit, the reader will be indemnified for the time spent in reading the well written monograph by a clear exposition of many important points in pathology and experimental surgery.

H. K.

VI. *The Ophthalmoscope. A Manual for Students.* By GUSTAVUS HARTRIDGE. 158 small-octavo pages, with two colored and two black plates, and 68 illustrations. Third edition. Philadelphia: P. Blakiston, Son, & Co., 1897.

This short and very elementary guide can be heartily recommended to the young ophthalmoscopist. Clearness, precision, and omission of all that is not essential distinguish this neat compendium. Its price, \$1.50, is a little more than the average rate of school books.

H. K.

VII. *Traité d'Ophtalmoscopie.* By ETIENNE ROLLET, Lyons. 379 small-octavo pages, with 50 chromo-lithographs and 75 text figures. Paris: Masson & Co., 1898.

This is an excellent text-book of ophthalmoscopy for the advanced student, and not at all below the horizon of the adept. It is reasonably complete. The 50 colored plates constitute an ophthalmoscopic atlas, which, together with the exposition of the optical foundation and the technique of ophthalmoscopy, supplemented by the description of what the eye mirror reveals, makes this treatise an elaborate monograph on the diagnosis and pathology of the intraocular affections. The handy, middle-sized volume will be read with delight and benefit by every ophthalmic practitioner.

H. K.

VIII. *Atlas der äusseren Erkrankungen des Auges, nebst Grundsatz ihrer Pathologie und Therapie.* By Prof. O. HAAB, of Zurich. 228 small-octavo pages, with 76 colored and 6 black illustrations. Price, M. 10 (\$2.50).

This is the counterpart of the same author's very popular atlas and *précis* of ophthalmoscopy. It is well worth reading, and, like the atlas, exceedingly priceworthy, but it will not assist the learner as much in the diagnosis of external eye diseases as the atlas does in the diagnosis of the internal. In external diseases nothing can replace the immediate clinical examination by good daylight. The book begins with a chapter on the examination of eye patients, 69 pages, and then describes the affections of the lacrymal organs, the lids, conjunctiva, cornea, sclera, iris, and ciliary body, lens, vitreous and orbit, and glaucoma.

H. K.

IX. **Atlas of External Diseases of the Eye.** By A. MAITLAND RAMSAY, M.D. Glasgow : Jas. Maclehose & Sons ; New York : The Macmillan Co., 1898. Price, \$16.

This is a work of great beauty : 195 folio-pages with 30 full-page colored plates, and 18 full-page photogravures. The illustrations are unrivalled, many of them masterpieces in their kind. The text gives connected descriptions of the diseases, supplementing the stages and phases not presented in the illustrations. It is prepared with the utmost care as to precision and comprehensiveness of language. The book is written for the observing and thinking student, describing the etiology, symptomatology, and pathology of the diseases, but omitting the treatment. The whole work, which in care of preparation and elegance of getting-up appeals, in contrast with the book of Haab, to a select class of readers, is an ornament to Scotch ophthalmology, and in particular to Glasgow, the place from which emanated the best "practical treatise on the diseases of the eye" before the discovery of the ophthalmoscope, the classical text-book of William Mackenzie.

H. K.

X. **Handeling by het Oogheelkundig Onderzoek.** (Technique of Ophthalmic Examination.) By Dr. H. SNELLEN, JR. 109 large-octavo pages, with 68 drawings. Groningen : Walters, 1898.

This very well written compendium reflects the simplicity, precision, and brilliancy of the classical school of Donders, of which the author and his father are the direct successors. It is gratifying to go over a book in which positive knowledge crowds out non-demonstrated novelties, however plausible they may appear.

H. K.

XI. **Oogheikundige Verslagen en Bydragen**, uitgegeven met het Jaarverslag van het Nederlandsch Gasthuis voor Ooglyders, No. 39. Utrecht, 1898.

A middle-sized octavo volume containing the annual reports of the Dutch ophthalmic institutions, supplemented by scientific contributions. These publications are not in the regular book-trade, but are sent to libraries and ophthalmologists who take an interest in Dutch literature. The contributions of general importance are usually published also in German, French, or English. They do credit to the famous little kingdom of the Netherlands.

H. K.

XII. *Anleitung zur microscopischen Untersuchung des Auges.* By Prof. R. GREEFF. A small-octavo volume of 77 pages, with 5 figures. Berlin : Hirschwald, 1898.

This little, neatly gotten up volume contains a description of the apparatus and methods for macroscopic and microscopic examinations of the visual organ, in all their detail, and according to the newest standpoint. Such a guide will be highly welcome to the ophthalmologist who wants to keep himself well informed by personal practical work in the scientific part of his specialty, though he cannot devote so much time to it as the professional investigator in the laboratory. H. K.

XIII. *Pathologie des Auges.* Bericht über die Jahre 1895 und 1896. By TH. AXENFELD and A. E. FICK. Chapter of Lubarsch u. Östertag's *Ergebnisse der allgem. Path. u. path. Anat. der Menschen u. der Thiere*. Third year. For 1896. Pp. 525-685. Wiesbaden : Bergmann, 1898. Reprint No. 5.

An excellent, critical report on the progress in scientific ophthalmology, with a complete bibliography. It contains : 1. Bacteriology and parasites of the eye ; infectious eye diseases : (a) ectogenous, (b) endogenous infections. 2. Eye affections connected with general affections. 3. Retinal tumors. 4. Malformations. H. K.

XIV. *Section XI.—Ophtalmologie du xii Congrès international de médecine de Moscou.* 1898.

This octavo volume, of 354 closely printed pages, contains the full translations of the ophthalmological section of this very remarkable convention. The volume, full of instructive papers and discussions, will not only be a gratifying souvenir to the attendants of the Congrès, but interesting and instructive reading to those of our colleagues who have not been able to visit the old Russian metropolis. The volume was prepared by the two presidents, Prof. A. A. KRUKOV and Prof. THEO. O. EVETZKY, and the secretary, Dr. S. S. GOLOVINE (address : Clinique ophtalmologique de Moscou). H. K.

XV. *Die Neurologie des Auges.* Ein Handbuch für Nerven- und Augenärzte. (The Neurology of the Eye. A Cyclopædia for Neurologists and Ophthalmologists.) By D. H. WILBRAND, Eye Specialist, and Dr. A. SÄNGER, Nerve Specialist, at Hamburg, Germany. Wiesbaden : Bergmann, 1899.

This first half of the first volume of the above work, a large-octavo volume of 406 well printed pages, with 63 text illustrations, contains a bibliography of 564 references ; the anatomy, physiology, and pathology of the eyelids, 61 pages ; the spasm of the elevator muscle, 4 pages ; and the paralysis of the elevator muscle (ptosis), 335 pages. At first glance it seems impossible to write 335 pages on the symptom ptosis, and yet the perusal of the book shows that there are no repetitions, no prolixity of style, but, on the contrary, an evident tendency toward condensation. And this is not all : according to the prospectus the greater part of the second half of the volume will still be devoted to the same subject. Nothing in the whole literature of the subject seems to be omitted. The more important questions, besides the general discussion, are supplemented by synoptical tables of the published cases. The work is calculated to fill four volumes. Volume ii. will contain the pupils ; Vol. iii., retina, optic nerve, hemianopsia, etc., and the functional nervous disturbances ; Vol. iv., the muscular errors of the eye ; the whole to appear in the course of three years.

Medical cyclopædias are now in fashion ; no doubt they are of great service as reference handbooks in rare cases and obscure or new subjects, both for the practitioner and the investigator. The work under consideration is destined to collect all that is worth knowing on the border line of two important and highly cultivated departments of medicine, the nervous system, and the organ of the highest sense. The happy co-operation of two investigators, each an authority in his field, living in the same town, and enjoying unrivalled hospital facilities, cannot but produce a work of the highest order.

H. K.

XVI. Diseases of the Eye. A Handbook of Ophthalmic Practice for Students and Practitioners. By G. E. DE SCHWEINITZ. Third, thoroughly revised edition, 696 octavo pages, with 255 illustrations and two chromo-lithographic plates. Philadelphia : W. B. Saunders, 1899.

The author shows also in this edition how earnestly and successfully he endeavors to keep his popular text-book (three editions in six years) abreast of advancing science. The bacteriology of the conjunctiva and cornea, so zealously cultivated during the last years, has received particular attention. Other subjects, *e.g.*, the Röntgen rays, eucaïn and holocain, the diseases of the sinuses, and the treatment of insufficiencies, have been added or considerably changed.

H. K.

XVII. **The Crystalline Lens System.** Its Embryology, Anatomy, Physiological Chemistry, Physiology, Pathology, Diseases, Treatment, Operations and After-changes, with a consideration of Aphakia. By LOUIS STRICKER, M.D. Cincinnati, O., 1899. A volume of 599 pages in octavo. New York : Lemcke & Buechner (812 Broadway).

The first 414 pages of this book are essentially a literary compilation, with extensive reproductions, from various authors, chiefly Otto Becker. The rest of the book is a bibliography of 3433 publications and an index of subjects. The typography and proof-reading leave much to be desired. The book contains a vast amount of subject-matter, and can be recommended as a large repository of valuable information.

H. K.



Fig. 1.



Fig. 2.

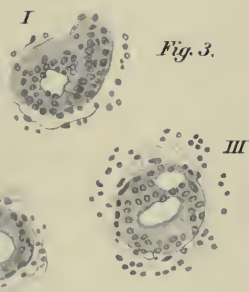
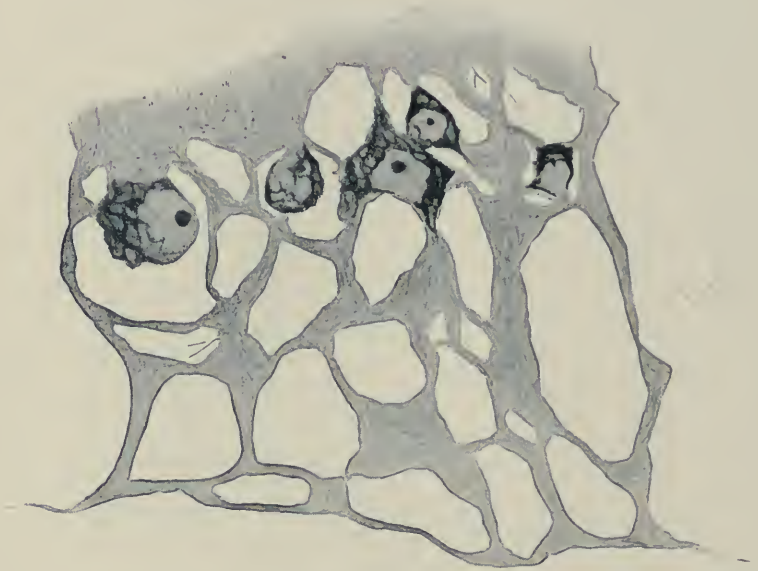


Fig. 3.



Fig. 4.



Bosse, del.

FIG. 1.—Ganglion-cell and nerve-fibre layers of retina, after hemorrhage.

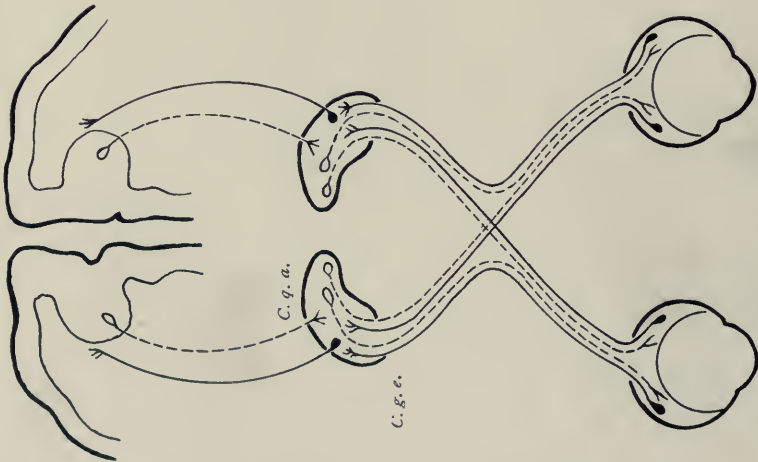


FIG. 2.—A diagram of the neurons of the visual tract.

ARCHIVES OF OPHTHALMOLOGY.

THE PATHOLOGY OF THE AMBLYOPIA FOLLOWING PROFUSE HEMORRHAGE AND OF THAT FOLLOWING THE INGESTION OF METHYL ALCOHOL, WITH REMARKS ON THE PATHOGENESIS OF OPTIC-NERVE ATROPHY IN GENERAL.¹

BY DR. WARD A. HOLDEN, NEW YORK.

(With two figures on Text-Plate VIII.)

I.—Amblyopia after Profuse Hemorrhage.

CASES of blindness after hemorrhage are reported from time to time, and, in its clinical aspects, this condition is well understood and may briefly be described as follows: Occasionally, after profuse or repeated hemorrhage from the gastro-intestinal tract or the uterus, and very rarely after surgical hemorrhage, there is noticed immediately, or, more frequently, after the lapse of days, a sudden diminution of vision in both eyes, which often goes on to complete and permanent blindness with the ophthalmoscopic picture of atrophy of the optic nerves.

In explanation of this condition many theories as to its pathogenesis have been offered, most of which assume pressure on the optic nerves or tracts from hemorrhage or exudation, and Graefe's theory specifically assumed hemorrhage into the sheaths of the nerve. Microscopic examinations of such eyes have not been wanting, and various pathological conditions of the retina have been described, but, as most of these examinations were made by older methods

¹ Read before the Ophthalmological Section of the New York Academy of Medicine, February, 1899. From the Pathological Institute of the New York State Hospitals.

and at a time when the significance of certain retinal changes was less understood than to-day, these reports led to no very definite conclusions, and it may safely be said that up to the present time no explanation of this condition has been generally accepted.

Since experiments on quinine amblyopia in animals¹ gave me a suggestion as to the cause of the amblyopia following hemorrhage, it seemed worth while to undertake some animal experiments in this regard; and, although it did not appear likely that complete blindness could be brought about by bleeding healthy animals, it nevertheless seemed probable at least that changes might be produced in the visual apparatus sufficient to indicate clearly the nature of the process that sometimes does lead to blindness.

And, in fact, experiments done at the Pathological Institute of the New York State Hospitals on half a dozen dogs and rabbits led to positive results, the pathological findings being, in short, as follows: One or two days after a single profuse hemorrhage, signs of œdema of the nerve-fibre and ganglion-cell layers of the retina were present, and some of the ganglion cells showed evidences of beginning degeneration. Two weeks after a profuse hemorrhage, or after repeated moderate hemorrhages, simple œdema of the nerve-fibre layer still existing, there were advanced degenerative changes in many of the ganglion cells and in the medullary sheaths of their axis-cylinders throughout the optic nerves, chiasm, and tracts.

The changes were so uniform in all, that only two cases need be related in detail:

CASE 1.—A healthy dog with normal eyes, weighing 4.5 K, was bled 120 cc from the external jugular vein, in chloroform narcosis, and was killed with chloroform, twenty-four hours later, vision apparently not having been affected, and the ophthalmoscopic picture remaining normal.

The retinas after being fixed in 5 per cent. formol, hardened in alcohol, and cut in paraffin, were stained by Nissl's methylene-blue method and the following changes were found: The fibres in

¹ These ARCHIVES, xxvii., 6, 583.

the nerve-fibre layer were slightly spaced apart, a number of Müller's fibres were ruptured, and the membrana limitans interna was detached here and there—changes indicating the presence of a non-coagulable liquid in the nerve-fibre layer, or, in other words, a simple serous œdema. Some of the ganglion cells had notched margins, and their chromatic granules were wanting in the periphery of the cell, indicating a beginning primary parenchymatous degeneration. The bipolar cells of the inner nuclear layer, instead of exhibiting a number of granules scattered through the nucleus, contained very few granules, and these were arranged mostly just at the margin of the nucleus, indicating disturbed nutrition of the cell. Further than this the retinas were normal.

CASE 2.—A healthy dog with normal eyes, weighing 8 K, was bled 250 cc from the external jugular vein under chloroform. After the effects of the chloroform had passed off, the dog staggered and was weak in its hind legs. Fifteen days later the dog was still quite weak and had become emaciated. Vision seemed to be good. No ophthalmoscopic changes were noticed in the retinas, but the optic discs appeared somewhat pale. The dog was killed with chloroform. No hemorrhages or other gross changes were found in the orbital or cranial cavities, nor, in fact, were gross changes found in any of the animals examined.

The retinas, stained by Nissl's method, exhibited signs of œdema of the nerve-fibre and ganglion-cell layers, and a lack of granules in the nuclei of the inner nuclear layer exactly as in Case 1. The ganglion cells, however, were in a more advanced stage of degeneration and more cells were affected than in Case 1 (Fig. 1, Text-Plate VIII.). The margins of the cells were notched and irregular, the chromatic substance was wanting in places, and frequently the cell body was partly broken down, and the nuclei in many cells had migrated to the periphery.

The optic nerves, chiasm, and tracts, stained by Marchi's osmic-acid method, now exhibited many black deposits, indicating a breaking down of the medullary sheaths of the fibres into fatty globules.

The pathological condition, then, was a degeneration of a number of retinal ganglion cells together with their long processes which make up the centripetal fibres of the optic nerve.

In order to learn whether changes had occurred in other

portions of the visual tract, the external geniculate bodies, the anterior quadrigeminal bodies, and the cortical visual area in the occipital lobe were examined for ganglion-cell changes, and the optic radiations were examined for nerve-fibre changes. No marked changes were found in the ganglion cells of these parts and none at all in the fibres of the optic radiations, which shows that in acute general anæmia the retinal neurons suffer more than the basal and cortical neurons of the visual tract.

Chronic anæmia, also, is not without its effect on the retinal ganglion cells. In cases of pernicious anæmia there have frequently been described hemorrhages and œdema of the retina and swelling of the axis-cylinders near the seat of the hemorrhages. Further than this, in two cases of pernicious anæmia with œdema of the retina and hemorrhages, but with no very marked changes in the axis-cylinders, I found the nucleus crowded to the margin of the cell in nearly every ganglion cell in the retinas. This migration of the nucleus is an early sign of some forms of ganglion-cell degeneration, and, while it is likely to be found in the ganglion cells of the central nervous system in wasting diseases, in a case of phthisis I found it existing in fewer retinal cells than in the cases of pernicious anæmia.

For the ordinary cases of amblyopia following hemorrhage, we have thus found a sufficient explanation in the degeneration of the retinal ganglion cells from diminished nutrition.

In these ordinary cases the vision fails in the entire field, while at first ophthalmoscopic changes either are wanting, or, if present, consist only in a slight œdema of the retina with or without hemorrhages, and in narrowing of the retinal arteries with consequent pallor of the optic disc.

For certain other cases this explanation is not sufficient. Such cases, for example, are the rare ones in which the visual disturbance takes the form of central scotoma and the ophthalmoscopic changes indicate retrobulbar neuritis; such, also, is the unique case recently reported by Amos,¹

¹ *Amer. Jour. of Ophth.*, May, 1898.

in which a uterine hemorrhage was followed by right homonymous hemianopsia, and a second uterine hemorrhage some time later led to left homonymous hemianopsia, with the preservation, finally, of only a minute central field.

Such exceptional cases require particular explanations, which can be given only after pathological investigation of the individual cases has been made.

II.—Amblyopia after Drinking Methyl Alcohol.

A suddenly developing amblyopia, in its clinical features resembling quinine amblyopia and the amblyopia following severe hemorrhage, is that which has been observed a number of times after the ingestion of methyl alcohol. A case of permanent blindness from swallowing 60 cc of methyl alcohol was reported a short time ago by McCoy and Michael,¹ and Dr. Callan recently related to the New York Ophthalmological Society the history of two men who drank an undetermined quantity of methyl alcohol, one dying of the effects and the other becoming totally blind. The similarity in clinical course suggested a similarity in pathology, and methyl-alcohol experiments were tried with several dogs. The animals, however, did not prove to be so susceptible to the toxic effects as might have been expected from what we know of the effects of methyl alcohol on man.

Thus, 25 cc of methyl alcohol given *per os* to a dog of 9 K weight, produced a dilatation of the pupils and a continued staggering gait, but, when the dog was killed on the third day, only very slight changes were found in the retina.

A successful experiment was the following:

Fan. 11, 1899.—A healthy dog, weighing 10 K, was chloroformed, and 50 cc of methyl alcohol, diluted with an equal volume of water, was introduced into the stomach through a tube. After recovery from the chloroform the pupils were quite small and the dog soon became violently intoxicated, throwing itself about in a frenzy.

Fan. 13th.—Pupils slightly dilated, general weakness, staggering gait.

¹ *N. Y. Med. Record*, May 28, 1898.

Jan. 16th.—Dog apparently well. Fundi normal. 50 cc of methyl alcohol, diluted, was given by the stomach tube without narcosis. Fifteen minutes later the pupils were very large, and the dog staggered about and bumped into objects as if it were completely blind. The hearing was not entirely abolished.

Jan. 18th.—Pupils of normal size, some general weakness, sight apparently fairly good, but the dog continually rubs its eyes with its paws.

Jan. 26th.—For the past three days the dog has eaten very little and is now greatly emaciated. The corneas have become diffusely hazy, except in the periphery, but the eyeballs present no signs of congestion.

Jan. 27th.—Early in the morning the dog was found dead, but still warm. The autopsy was made at once. Great congestion and numerous hemorrhages were found in the meninges of the cord and brain.

The retinas were stained by Nissl's method. There were post-mortem changes in the rods and cones. The bipolar cells of the inner nuclear layer appeared normal. The nerve-fibre and ganglion-cell layers were slightly œdematous, but no hemorrhages were found. Many of the ganglion cells were in a state of degeneration. In the optic nerves, stained by Marchi's method, the medullary sheaths of some of the fibres were broken down.

The amblyopia due to the use of methyl alcohol, therefore, comes into the category of those amblyopias which are due to nutritive disturbances in the ganglion cells of the retina.

III.—General Remarks.

These amblyopias are so rare that they are comparatively of little clinical importance, but their pathology, as now revealed, is extremely suggestive as regards other amblyopias that are more common, and, therefore, of greater clinical importance, and I should like to say a few words, in a preliminary way, on the physiology of the neurons of the visual tract and on our present conceptions as to their pathology.

The ganglion cell, with its short processes and its long axis-cylinder process which is generally medullated and ends in a terminal arborization, is now comprehensively termed "the neuron," since it is the fundamental nerve element or histological unit.

To-day, thanks to the labors of Gudden, Monakow, Henschen, Ganser, Bechterew, Bernheimer, Ramon y Cajal, and many others, we understand fairly well the arrangement of the neurons in the visual tract, and may most simply represent them schematically in the manner shown in Fig. 2, Text-Plate VIII.

Between the retina and the basal primary optic centres—the external geniculate body, the anterior quadrigeminal body, and the pulvinar—neurons extend both centripetally and centrifugally; and, also, between the cortical visual area and the basal primary optic centres neurons extend both centripetally and centrifugally.

The nutrition of the neuron is governed by the ganglion cell. If the axis-cylinder is cut or compressed, its distal portion which is separated from the ganglion cell atrophies quickly, but the proximal portion remains intact. The neuron, however, cannot now perform its function, and, after months or years, the remaining portion of the axis-cylinder breaks down and the cell then usually degenerates and disappears.

Similarly, a *primary* atrophy of the centripetal neurons of the optic nerve from disease of the retinal ganglion cells or from section of the optic nerve, is followed later by a *secondary* atrophy of the non-functionating centrifugal neurons whose ganglion cells lie in the primary basal optic centres. Removal of the cuneus of the occipital lobe is followed, first, by a primary atrophy of the fibres running to the basal optic centres, and, later, by a secondary atrophy of those cells lying in the primary basal optic centres, whose axis-cylinders run to the cuneus. In young animals these secondary degenerations, as Gudden long ago showed, come on very soon. In adult animals they are longer delayed, and months and even years must elapse before the process is complete. Thus, in adults, after section of the optic nerve or after disease of the primary optic centres, descending atrophy of the centrifugal fibres in the optic nerve and retina takes place, but the retinal ganglion cells may remain for years. For example, in a case of pressure on the optic tracts from an enlarged pituitary body in akromegaly, with

white discs and great contraction of the visual fields, the process having lasted for years, I found the ganglion cells still preserved even in the extreme periphery of the retina.

The important point which I now wish to make is that, in the absence of inflammation in the interstitial connective tissue of a tract of nerve fibres, and in the absence of direct pressure on them, a primary atrophy of these fibres, according to our present conception of the neuron, is due to disease of the ganglion cells from which the fibres arise.

Therefore, in the simple atrophy of the optic nerve that comes on in nervous diseases like tabes, for example, we should expect to find either disease of the ganglion cells in the basal optic centres, or of the ganglion cells in the retina.

Disease of the basal optic centres of one side, however, causes homonymous hemianopic defects in the visual fields of the two eyes, but homonymous hemianopic defects are very rare in tabes. Disease of the basal optic centres, furthermore, while it causes atrophy of certain fibres in the optic nerve and retina, does not cause degeneration of the ganglion cells in the retina until later. In complete tabic atrophy of the optic nerve, on the contrary, the retinal ganglion cells have been found by various observers to have disappeared. And the complete proof of the retinal origin of tabic optic-nerve atrophy seems to me to be furnished by a case I am now examining, that of a tabic patient who was blind for four years before his death. In the retina there can be found only isolated degenerated ganglion cells here and there, even in sections through the macula, about which the ganglion-cell layer normally is thickest.

The second cellular stratum in the superficial portion of the anterior quadrigeminal body, composed of elongated ganglion cells, is now generally conceded to be that from which arise the bulk of the axis-cylinders which run from the basal optic centres to the retinas. In this case of tabic atrophy of the optic nerve, the cells of this stratum, as compared with those in sections from a healthy brain, appear to be normal, both in number and appearance. These conditions thus clearly indicate primary degenera-

tion of the retinal neurons, unaccompanied as yet by secondary degeneration of the basal neurons.

The conception of tabic atrophy of the optic nerve as being due to disease of the retinal ganglion cells may seem radical to ophthalmologists, for they have commonly regarded tabic optic-nerve atrophy as being an affection purely of the optic nerve itself, related in some mysterious way to a disease of the spinal cord; but neurologists, now conceiving tabes to be a primary degeneration of various distinct groups of neurons in the body, are already hinting at a degeneration of the peripheral neurons in the optic-nerve atrophy of tabes. Besides finding that the atrophy of the optic nerve in some varieties of acute amblyopia is due to an affection of the retinal ganglion cells, I found that the optic-nerve atrophy in amaurotic family idiocy or Tay's disease of the macula lutea is due to a primary disease of the ganglion cells of the retina.¹ And, while the causation of optic neuritis is still entirely obscure, and the process in retrobulbar neuritis, of toxic or other origin, is as yet not definitely understood, the ordinary so-called simple atrophies of the optic nerve are likely soon to be generally conceded to consist in a primary degeneration of the ganglion cells of the retina and their axis-cylinders running to the basal optic centres.

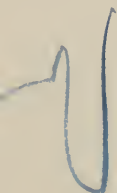
Explanation of the Figures.

FIG. 1, Text-Plate VIII.—Œdema of the nerve-fibre and ganglion-cell layers, and advanced degeneration of the ganglion cells in a dog's retina fifteen days after bleeding 31 cc to the kilo of body weight. Nissl stain. Zeiss $\frac{1}{8}$ immer. Comp. oc. 8. Reduced $\frac{1}{2}$.

FIG. 2.—Diagram of the neurons of the visual tract.

From the temporal halves of the retinas afferent neurons run to the basal centres of the same sides, and from the nasal halves to the centres of the other sides. From the right basal centres efferent neurons run to the right halves of the retinas, and from the left basal centres to the left halves of the retinas.

¹ *Journal of Nervous and Mental Disease*, July, 1898.



In the second system, neurons run from the basal centres of one side to the neighborhood of the calcarine fissure of the same side, and corresponding neurons from the gray matter about the calcarine fissure run back to the basal centres of the same side.

THE INTRODUCTION OF IODOFORM INTO THE ANTERIOR CHAMBER OF THE EYE IN TUBERCULAR IRITIS.¹

By N. J. WEILL, M.D.,

ASSISTANT TO THE CLINIC.

THE decided amelioration, if only of limited duration, observed in a case of irido-ciliary tuberculosis, treated with subconjunctival and intraocular injections of sterilized iodoform, led to the idea of conducting a series of similar experiments on animals. Inasmuch as this very case has already been published by *Ammann* in the *Klinische Monatsblätter für Augenheilkunde*, May, 1897, a comparison between his results, which were made upon the human subject, and those obtained from experiments on animals may be of interest.

Ammann's description briefly reviewed: Irido-ciliary tuberculosis of one eye, accompanied by swelling of the preauricular gland on the same and the submaxillary on both sides. At first treated with subconjunctival injections of an iodoform-vaseline salve 1 : 5, and the tubercular process advanced. Later sterilized iodoform powder was introduced into the anterior chamber, and a decrease in the size of the tubercles of the iris followed. Although another introduction of iodoform was made, an advancement in the process was noted, and the enucleation carried out. Microscopically the tumor was found to consist mainly of a mass of granulation tissue, formed principally of closely aggregated tubercles, separated from one another by sparingly interwoven connective tissue. A most thorough search for the tubercle bacillus terminated negatively.

¹ From the University Eye-Clinic in Zürich.

The results of iodoform and its various combinations in localized tuberculosis taught us not to expect a cure in advanced cases. Therefore we did not conduct our experiments with the expectation of a cure in similar cases in rabbits—a class of animals peculiarly susceptible to this disease,—but our researches took rather the form of an investigation of its ameliorating power, hoping thus to test its fitness for tubercular iritis in the human subject. That investigations of this kind may yield practically useful results, appears demonstrated by inoculation experiments of H. Knapp,¹ who reported an interesting and unique observation on this question which it is well to bear in mind. He describes the *spontaneous* cure of an artificial binocular tubercular iritis in a rabbit, which took place, not as tubercular affections generally do in the human being, by the process of calcification or shrinkage after ulceration, but by simple absorption, just as a gumma of the iris disappears.

For the subject of this article I am indebted to my chief, Prof. O. Haab. For this as well as for his able advice and aid at other times, I take this opportunity to most heartily thank him.

Owing to the condition of the instruments used and the extreme wildness of the rabbits, the wounds could not be as clean cut as in the human subject; therefore in considering the results an allowance must be made for undue consequent reaction.

In March, 1897, we implanted in the anterior chamber of two rabbits, material which had been taken from a human iris and ciliary body, diagnosed as tubercular. This assumption was, later, not only verified by a typical picture of tubercular iritis in all four eyes of the rabbits, but also by finding the tubercle bacillus in the anterior uveal tract of the enucleated bulbus. A brief description of this is published by the author, in the *Archiv für Augenheilkunde*, vol. xxxvi., p. 96.

One of the foregoing rabbits, which for the sake of convenience we will term No. I., was chosen as a fit subject for experiments, inasmuch as after the lapse of but four weeks from the exposure

¹ "Beitrag zur Tuberkulosenfrage." Festschrift zur Feier des siebenzigsten Geburtstages von Hermann von Helmholtz, Stuttgart, 1891.

of the iris to the tuberculous material located in the anterior chamber, tiny tubercles of a yellowish-gray tint, occupying an asymmetrical position in the lower half of the iris, are readily recognizable under an ordinary magnifying-glass.

Method of sterilizing the iodoform: Place the iodoform in a 3 % solution of carbolic acid for forty-eight hours. Pour the acid off. Plug the receptacle with sterilized cotton, put it in an oven with a constant temperature of 40° C. to dry and free it from the remnants of carbolic acid.

The operative technic also demands attention, inasmuch as it may be the first attempt to introduce a remedy in powdered form into the anterior chamber: 1. Cleanse and cocainize the conjunctival sac. 2. Apply the *ecarteure* and fixing forceps. 3. Puncture the cornea with the lance. This wound should be just sufficiently large to comfortably admit an ordinary canula. 4. The latter instrument, previously partially loaded with sterilized iodoform, is introduced into the anterior chamber and its contents deposited by means of a blunt trocar. The trocar is blunt, to avoid injury to the lens capsule, and to discharge the contents of the canula more advantageously. This same technic may serve to introduce other substances into the anterior chamber, etc., in other diseases.

RABBIT NO. I.

iv. 3. 97. The attempt is made to introduce sterilized iodoform into both eyes, but in the right we only partially succeeded on account of the extreme wildness of our subject.

iv. 6. It is a noteworthy fact that the left eye, which contains the more iodoform, shows the less external inflammation.

iv. 10. A fair-sized hyphæma is present in both eyes, probably of artificial origin.

v. 4. O. D. The ciliary reddening is still marked. Our small injection is yet present in at least half of its original quantity and has not perceptibly influenced the growth of the tubercles, which have become four times their former dimensions. The iris about these growths is thickened and some of its blood-vessels are fairly dilated.

O. S. The pericorneal congestion is but minimal. The hyphæma is totally absorbed. The mass of iodoform which was in-

troduced into this anterior chamber has been almost completely taken up. The minute superficial tubercles of the iris noticed at the time of the injection of the iodoform have left no definite trace. The remaining portions of the iris are free from any manifestation of inflammation or hyperæmia.

In one eye the introduction of a small quantity of iodoform powder into the anterior chamber was followed by abundant accidental hemorrhage and a positive advance in the tuberculosis; in the other eye the introduction of a larger quantity was followed by a slighter accidental hemorrhage and distinct alleviation of the symptoms. The logical conclusion is that the favorable issue in the latter case is due to the iodoform.

v. 22. About eleven weeks since the primary inoculation and seven weeks since the injection of iodoform took place; in O. D. the ciliary congestion, the well filled corneal blood-vessels, and opacity are still conspicuous. The slight amount of iodoform has disappeared. The tubercles situated in the lower central portion of the iris have markedly grown and are surrounded by numerous minute elevations. A second operation is determined upon. After great difficulty a minimal amount of iodoform reached the desired location.

O. S. This eye received the more tuberculous material as well as the more iodoform. The iris, as examined with the magnifying-glass, is perfectly free from tubercles. The iodoform mass has undergone a slight reduction in quantity.

vi. 10. O. S. It is now about five weeks since the disappearance of the tubercles. The iodoform has been completely absorbed. After this interval of apparent freedom from any tubercular infiltration, three minute grayish-yellow elevations, tubercles, are noticed with the magnifying-glass. They are situated in the central portion of the upper half of the iris, diametrically opposite the seat of the former nodules. The iris in this region just involved is slightly swollen and two small blood-vessels are prominent.

vi. 18. O. D. Operation No. 3. Even after the lance had finally forced an ample entrance into the narrow anterior chamber the attempt to introduce an adequate amount of iodoform into this lessened space is fruitless. Unluckily there is some iodoform forced into the cornea propria which forms the incision lips.

O. S. Operation No. 2. A decidedly smaller modicum of iodoform is injected than at the preceding sitting.

VI. 24. O. D. Between the lips themselves and in the corneal substance composing the same considerable iodoform remains. It was decided more advisable to allow this scattered iodoform to remain undisturbed, even if its inhibition demand some time, rather than attempt to advance it into the anterior chamber.

VII. 2. O. D. As the nodules have grown and the general swelling of the iris persisted, a dispersion of the iodoform in the wound itself and in its surroundings seemed urgently demanded. Accordingly this was undertaken and accomplished after much difficulty. The corneal wound was simply partially bridged by epithelium and a few scanty adhesions in the cornea propria.

O. S. The external injection has become comparatively faint. The magnifying-glass reveals the three minute protuberances to have become more grayish in color, contracted, and so indefinitely outlined that they are scarcely recognizable. The dilated blood-vessels of the iris in this immediate region have undergone a like retrograde fate. The iodoform has diminished in quantity—not less than one third of its volume has been taken up.

VII. 7. O. D. The iodoform has remained quite unchanged in amount. A thin membrane covers its anterior surface. The process advances.

O. S. Instead of viewing the iris almost free from papules, as might be expected from the rate of improvement, an advancement is perceived in the tubercular infiltration which has taken on the form of a cone with very minute papules occupying its entire apex. This cone is situated in the exact position of the three former protuberances, described for the first time VI. 18. Just here a distinct hyperæmic condition is conspicuous. Massage of the bulbus was employed to scatter the iodoform. (The massage was effected by friction under considerable pressure between the closed lid and the cornea.)

VII. 13. O. S. The rapidity with which the conus has diminished is most surprising, as to-day it is not more than one fourth its former size, and shows a total disappearance of those plainly outlined knobs which so recently occupied its apex. In this same region of the iris a small anterior hunchbacked protuberance is perceived—probably also of tubercular nature. It is peculiar that the process should here show a recession and there an advancement, all within a space with a diameter of about $\frac{3}{4}$ cm. That the massage employed at the last inspection had any direct beneficial action upon the tubercular process can only be very

guardedly claimed, but it is more plausible that it was it that altered the relation and condition of the particles composing the mass of iodoform.

VII. 19. O. S. *Singularly the conus has entirely disappeared, and its seat is only indicated by a small, shallow, grayish-brown excavation of irregularly circular form.* The hunchbacked elevation is scarcely more conspicuous than at the last examination, but now, not far from it, are two grayish-yellow nodules situated side by side, and together hardly the size of an ordinary pin-head. The iodoform shows neither alteration in position nor in amount.

VII. 31. O. D. The pathological condition has slowly progressed.

O. S. There is no pericorneal congestion. The iodoform has entirely disappeared. The coalescence of the two flattened tubercles is detected now with ease. These knobs have not grown particularly anteriorly, but have caused infiltration of the surrounding iris, which from its own thickness makes the corresponding portion of the already much altered anterior chamber appear unduly shallow. The blood-vessels of this pathological portion are overfilled and converge to a point where an anterior synechia is located. A white, and as it appears, fairly thick-fringed membrane slightly projects into the pupillary space, having its attachment in nearly its entire circumference on the posterior surface of the pupillary margin of the iris. On this same day the rabbit was killed by chloroform, and its eyes enucleated. The histological examination of the bulbi is given after the clinical description of rabbit II.

Inasmuch as our first experiment (rabbit No. I.) was obscured, whether favorably or unfavorably, by the intercurrent hyphæma, we now took a second animal.

RABBIT NO. II.

V. 22. 97. Both eyes are treated with material obtained from the more tubercular bulbus (O. S.) of the mate of rabbit I. To this material in the case of the right eye we injected enough iodoform to about half fill the anterior chamber. The left eye was allowed to develop untreated with iodoform.

The difference is striking between the appearance of the *left* eye of rabbit I., until now (v. 22. 97.) successfully treated with iodoform, and which is apparently free from tubercular infiltration, and the *left* eye of its mate, which never was subjected to the

action of iodoform, and in which a like material inoculated at the same sitting has made such rapid headway that a perforation is imminent at the sclero-corneal junction, in the position of the incision made for transporting the tuberculous substance into the anterior chamber.

vi. 3. O. D. The upper two thirds of the cornea presents a peculiar bluish-white opacity in the form of minute dots of irregular conformation and of narrow streaks, most of which cross the cornea in the horizontal direction. They are probably situated on its posterior surface. They are totally unlike the ordinary precipitates seen for example in so-called iritis serosa. The iodoform has seemingly lessened in bulk.

vi. 15. O. D. To simplify the description of the cornea, it can be divided into three zones,—the lower one lightly covered with blood-vessels, which are arranged much like “Nettleship’s blood-vessels in interstitial keratitis”; the middle area presents the light-bluish opacity already spoken of in the centre only, just in front of the pupil, whereas the periphery is almost transparent, as is the entire upper third. The iodoform mass is unchanged.

O. S. The cornea as a whole appears enlarged and in its entire expanse presents the same bluish tone which is perceived in front of the pupil in the right cornea.

vii. 2. O. D. The light blue opacity in front of the pupil has disappeared. The iodoform is nearly absorbed. The tubercular mass has altered its contour; its former position in the lower anterior chamber is retained. The outer half of the pupil is partially hidden by a whitish arborescent membrane attached to the pupillary border of the *anterior* surface of the iris and to the anterior lens-capsule. The beginning of a similar membrane is seen on the nasal half.

O. S. The inspection of the iris reveals a number of small tubercles and dilated blood-vessels. The tubercular inoculation has disappeared.

vii. 7. O. D. The iodoform is completely taken up. The tuberculous inoculative substance has also vanished. The magnifying-glass easily discovers three yellowish-gray tubercles in the inferior portion of the iris. A second operative interference is immediately decided upon for the purpose of bringing iodoform in contact with these papules. The anterior chamber was nearly filled with iodoform.

O. S. There is a raging inflammation. The periphery of the

cornea shows a pannus of about $\frac{1}{4}$ cm in width, which toward the scar attains fully $\frac{3}{4}$ cm; the more central portion is unequally bluish. There is a slight anteriorly cone-like bulging of the incision scar.

VII. 19. O. D. The cornea shows a faint bluish opacity again. The iodoform has considerably diminished. There is a broad anterior synechia extending from the scar of the last incision as far as the sclero-corneal junction.

O. S. The conus in the region of the wound is less conspicuous, as the entire cornea has enlarged.

VII. 31. O. D. Minimal amount of iodoform present. Partial pupillary membrane smaller. Lens reflects as the human lens does when marked sclerosis of its nucleus is present. The three nodules have assumed a more *grayish* color. A fourth minute, yellowish-gray papule has been added to them. The iris here is somewhat swollen and blood-vessels are prominent.

O. S. The entire cornea with the exception of its very centre is covered by the progressive pannus. The cornea is anteriorly ovoid.

The rabbit is killed and the right eye only enucleated.

The O. D. and O. S. of rabbit I. and the O. D. of rabbit II. are now taken for microscopical examination. A small equatorial cut was made in each bulbus in order that the hardening and fixing fluids might better act upon the contents of the capsule. Alcohol is employed as the hardening agent, first 70%, next 96%, and last the alcohol absolutum. They remained here over two months. The bulbi were then halved. The anterior halves again vertically divided, placed in celloidin, and cut in 70% alcohol. The stains utilized were: alum-carmine, eosin and hæmatoxylin, van Gieson's, Weigert's fibrin-stain, and the carbol-fuchsin (*i.e.*, the solution of Ziehl). The method of staining the tubercle bacillus described in a former article by the author was closely followed. The picric-acid-fuchsin solution used in the van Gieson procedure was diluted to a *light* red in order that the sections might remain $\frac{1}{2}$ -1 hour therein. The nuclei retained the *bluish* color entrusted to them by the hæmatoxylin, and the surrounding tissues took much the same nuances as from the stronger solutions.

MICROSCOPICAL EXAMINATION.

RABBIT I. O. D. The histological examination of the cornea corresponds quite exactly with the delineated clinical

course: dense infiltration of the scars and surrounding tissue with round cells, etc., synechiæ. The anterior chamber shows many aggregations of round cells, and presents also red blood corpuscles enclosed in networks of fibrin. The sclera is quite normal except for slight infiltration with round cells. The anterior surface of the iris presents a loose fibrinous layer, scantily infiltrated with round cells in those situations where it is not attached to the posterior corneal level. Some few preparations exhibit an almost normal iris, except for anterior synechia, the layer of fibrin, or a slight infiltration of round cells, but in *most* of the sections it is thickened, especially the pupillary portion, and is typically tubercular. Many epitheloid and giant cells enclose both fine and coarser pigment granules. Tubercle bacilli were only found in giant cells and by no means as plentifully as is usual in the artificially inoculated rabbit-iris. Posterior to the iris a broadly extending exudation is perceived, composed solely of lymph cells. Nearly the entire ciliary body is markedly thickened, resulting from dilatation of its blood-vessels and consequent outwandering of lymph cells. Epitheloid cells are observed in that portion adjoining the tubercular iris. Giant cells and tubercle bacilli fail. There is accordingly no correspondence between this picture and that described by *Ammann*.

O. S. Cornea, sclera, and anterior chamber much the same as in the right eye. The iris is, as a whole, thickened, resulting from vascular dilatation, from immigration of lymph cells and from distinctly tubercular masses containing numerous epitheloid and few giant cells. The search for the tubercle bacillus in these preparations was unsuccessful. Here, as in the right eye, a broad layer of lymph cells was found on the posterior surface of the iris. The ciliary body is quite normal in some sections, whereas in others, where it adjoins tubercular iris, it is highly hyperæmic and infiltrated with round cells.

RABBIT II. O. D. As in the other bulbi small isolated aggregations of round cells and fibrin are found on the membrane of Descemet, so also remains of anterior synechiæ in the form of a narrow mass of iris-tissue, which is bound

to the posterior surface of the cornea merely by a layer of round and connective-tissue cells. Small and broader anterior adhesions are observed. Corresponding to the pupillary exudate clinically noticed, a mass of vascular connective tissue infiltrated with lymph cells and attached to the pupillary ends of the iris sends out projections posterior to the iris. Most of them are free with torn borders, the result of the rupture from their attachments probably to the anterior lens-capsule (of which nothing is seen in the sections). This rupture is caused by the removal of the densified lens. Near the centre of the lower half of the anterior chamber is a small mass of granulation tissue with epitheloid cells, which is attached anteriorly to the cornea and posteriorly to the iris. This is an outgrowth from the iris, whose most superficial layers are also involved. Only a scanty number of epitheloid cells are present. It is fair to presume that but for the unfavorable condition produced by the iodoform these latter cells would have built giant cells. The result of the search for the tubercle bacillus was negative. A few small collections of round or epitheloid cells alone, or a combination of the two, are found in the iris. In most of the preparations the iris is normal, save for the dilatation of its blood-vessels and exudation from the same. The ciliary body is absolutely normal, with the exception of dilatation of its vessels and a very sparing transudation of lymph cells.

If in the acute tubercular iritis only the visibly diseased portions and their immediate surroundings are excised (iridectomy), it is probable, according to Leber "*Über abge-Schwächte Tuberculose des Auges*," *Bericht über die xxi. Vers. der ophthalm. Gesellschaft zu Heidelberg*, 1891, p. 44), that some affected iris yet remains, which is now capable of aggravated advancement, and further, as the process is acute, that this newly developing tissue contains more virulent and perhaps more abundant bacilli than in the chronic forms, making it very probable that bacilli will be scattered in the region of the wound in the course of the excision of diseased iris, which truly would be deleterious.

The opening through which, in our experiments, the iodoform was introduced into the anterior chamber lay wholly

within the cornea, so that all immediate contact with the bacilli was avoided, thus making our operation applicable to the acute as well as to the chronic form. Iodoform is free from the danger of arousing a latent tuberculosis in other organs, as occasionally resulted from Koch's lymph even in selected cases.

Before summing up, it is important to bring once more to mind the well acknowledged fact that rabbits possess a most extraordinary predisposition to tubercular affections. Is it then improbable that the results would be still more beneficial in the human subject? From the clinical details and the results of our histological examination the following conclusions are drawn :

1. Sterilized iodoform is slowly taken up from the anterior chamber even if the boundaries of the latter are diseased.

2. It undoubtedly exercises a mitigating influence not only in an eye in which tuberculous material is simultaneously introduced, but also in those eyeballs in which the iris had previously been tuberculous.

3. It is probable that the tuberculous process in the bulbi already tuberculous would have been less intense if the inoculation could have been made more thorough and kept free from unexpected deleterious complications.

4. Iodoform inoculation may bring about at least a temporary retardation of the tubercular invasion, and afford sufficient time to build up the general system enough to resist the invading bacillus. It is not incompatible with other remedies, but on the contrary needs them as adjuncts.

5. It is applicable in acute as well as in chronic cases.

A CASE OF MELANO-SARCOMA OF THE CHOROID.

BY MATTHIAS LANCKTON FOSTER, M.D., OF NEW YORK.

THE following case illustrates the difficulty sometimes met with in the diagnosis of this disease from inflammatory glaucoma, and so seems to me to deserve record.

A woman, forty-eight years of age, came to my office, August 22, 1898, on account of excessive pain in her left eye. She stated that she had never had any trouble with her eyes until about five weeks previously, when she was suddenly seized with intense and persistent pain in her left eye. Three weeks before she consulted me she entered one of the ophthalmic hospitals in this city, where an operation was performed. At the end of a week she left the hospital, though the eye was still inflamed and the pain continued. She asserted that on the day of the operation she could see with that eye, though not so well as with the other.

On examination of the eye, I found the vessels of the ocular conjunctiva engorged, the cornea slightly hazy in places, the anterior chamber apparently absent, a narrow, artificial coloboma in the upper part of the iris, with a prolapse of iris in each angle of the corneal cicatrix, and the lens partially cataractous, so that no view of the interior of the globe could be obtained. The tension of the globe was $+ 3$. There was no perception of light.

The case appeared to be one of absolute glaucoma, in which a narrow iridectomy had failed to give relief, but had added complications in the form of two prolapses of the iris. As all perception of light had been destroyed, and it was very doubtful if satisfactory relief from the intense pain the patient was suffer-

ing could otherwise be obtained, I advised enucleation, and performed the operation a few days later at the Manhattan Eye and Ear Hospital. Dr. E. S. Thomson, Pathologist of the Hospital, furnished me the following report :

The eye, after hardening, was sectioned horizontally and the gross specimen showed the following points : globe of normal size ; anterior chamber entirely obliterated ; iris lying between lens and cornea with a few posterior synechiæ ; ciliary body atrophied ; lens opaque ; retina totally detached, in funnel shape, and adherent to posterior part of lens ; vitreous absent ; a greenish sero-fibrinous exudate lying beneath the retina ; a firm, deeply pigmented, disc-shaped tumor, about one inch in diameter, lying immediately to the temporal side of the optic nerve and a little below the equator.

The microscopic section showed all the above points in detail. The choroid, iris, and ciliary body were very markedly atrophic. The optic nerve was the seat of a leucocytic infiltration. The tumor was composed of round cells, with large nuclei, and was deeply pigmented throughout. It was moderately vascular, and seemed to spring from the layer of large vessels in the choroid. It was sharply defined, and no traces of extension could be found.

ELECTRO-MAGNETS FOR USE WITH THE 110-VOLT DIRECT-CURRENT LIGHTING CIRCUIT.

BY A. B. KIBBE, M.D., SEATTLE, WASHINGTON.

THE annoyances incident to the use of batteries, either of the primary or storage type, for exciting small magnets such as are used by ophthalmic practitioners, are often serious. In the former, the necessity of frequent renewal of the exciting fluid, and in the latter, the trouble of having them charged, together with the more important fact that without using measuring instruments, ammeters and voltmeters, we have no guide as to whether or no our magnet coil is receiving the proper current strength, constitute objections sufficient to warrant one in looking for a more suitable source of energy.

Where available, we have in the direct-current lighting circuit, whether of the 110- or 220-volt variety, a means of exciting magnets which is not only constant in action and free from the annoyances incident to batteries, but which, in addition, provides us with an indication of the current flow. By the use of a current tap,¹ an appliance which is screwed into the ordinary lamp socket and which holds any size of lamp desired, we can obtain almost any strength of current and have in the glowing of the lamp an indication of the current's passage. Incandescent lamps allow approximately the following current strength to pass: 8-candle power, one-fourth ampere; 16-candle power, one-half ampere; 32-candle power, one ampere, and so on, but as lamps of more than 50-candle power are rarely used for general

¹ Made by J. C. Vetter, E. 23d Street, New York.

purposes, the latter will give us the limit ordinarily attainable—that is, one and one-half amperes.

More than a year ago I designed a form of hand magnet to be used in the way above described, and have found it so convenient and effective that I am led to call the attention of ophthalmic surgeons to its use. In its complete form it is seven inches in length and one and three-eighths inches in diameter. With the tips which I use, and which, as will be seen, are very different from those usually supplied, its lifting power is as follows: with a 32-candle power lamp in the current tap and, therefore, approximately, one ampere of current strength circulating in each turn of the wire in the coil, the smallest tip, one-eighth of an inch in diameter and four-fifths of an inch in length, and with a flattened face, sustains twenty-one ounces. One of the same dimensions, but one-fourth inch long, sustains fifty-three ounces. A tip one-fourth of an inch long, and one-fourth inch in diameter will lift more than seven pounds. With a 50-candle power lamp all these quantities are increased slightly.

The type of magnet generally in use is that known as the Hirschberg model, and from a recent statement by its designer¹ some idea of its strength in comparison with that which I am describing may be obtained. It should, however, be stated that such comparisons are not trustworthy unless the same tips and body acted upon are employed in each instance. According to this statement, the largest tip of the Hirschberg magnet holds easily one pound. Though in the case of mine a tip one-eighth inch in diameter and extending four-fifths of an inch from the magnet's face sustains twenty-one ounces, this does not necessarily imply vastly greater strength; for, as before stated, without using the same tips and object we cannot draw safe conclusions. In comparing this magnet with those in the shops which are said to be Hirschberg models, I found that mine was decidedly stronger. The shape of the tips, however, was not the same. This brings me to consider a very important point in the matter of tips for hand magnets. As regards shape, one is apt to be influenced by personal predilection,

¹ *Centralblatt für praktische Augenheilkunde*, Jan., 1893.

but one feature should always be borne in mind, namely, the shorter the tip the greater its attractive and sustaining power, and these qualities are correspondingly greater the larger the area presented to the foreign body. Quite as important as the shape is the manner in which the tip is connected to the magnet core. If made to screw in, the contact can scarcely be made perfect, and unless it is, the loss may be enormous if the butt does not reach quite to the bottom of the thread-hole. The best form of connection is a bevelled slot in the face of the core and a corresponding shoulder on the tip. This gives a broad and even contact, with no danger of an air gap. Tips may be made of any shape, but I have always used perfectly straight ones, four in number. One, four-fifths of an inch long and one-eighth inch in diameter, with its face flat, the edge being simply smoothed off. A second, the same dimensions but only one-fourth of an inch in length. Both are round. One similar to the first, but flat, having a thickness of but one-sixteenth of an inch. The fourth is one-fourth of an inch in diameter, round, with smooth edges at the face.

In six cases of particles of iron lodged within the eyeball, five were successfully removed with this magnet. One, which a radiograph showed to be shaped like a spear-point and having its base spread out like barbs on each side, was drawn up to the incision but could not be extracted without extensively enlarging the wound. As the eye was in a condition of irido-cyclitis and vision totally destroyed, enucleation was advised but refused. In one the particle had been in the anterior chamber three weeks and was very firmly adherent to the iris, which in turn was in firm contact with the lens. It required quite a perceptible pull for its removal. Three weeks later the patient had vision $\frac{20}{200}$ and the eye was free from irritation. In a third the particle was deep in the vitreous in upper and inner quadrant, as shown by radiograph. It was extracted at the first attempt and the eye preserved with vision equal to what it had been immediately following the injury, which was very little,—ability to count fingers at three feet. The piece was seven millimetres in length by two in width. In the remainder,

the particles were in the anterior chamber in two and in the lens in one. In only one was it necessary to introduce the tip into the globe.

The facility with which such a magnet lends itself to use in the lighting circuit led me recently to devise a larger instrument and one having, roughly, about three times the power of that previously described. Its weight, ten pounds, precludes its use as a hand magnet in the sense that the operator sustains its weight. It may be suspended above the patient, however, in such a way as to give the surgeon complete command over it and can be used with quite as much facility as the smaller one. It is fourteen inches in length and two inches in diameter, and is so wound that the 110-volt direct current can be used without any lamp, the connection being made direct. For convenience a current tap may be employed in the absence of proper arrangements and a 50-candle power lamp used, or a parallel tap may be used. From this we can take a full current and the lamp though not in the circuit with the magnet will still burn. These taps obviate the necessity and extra expense for wiring and are extremely convenient appliances.

In using this form of magnet, it is suspended by a ring attached as nearly as possible to its centre, thus permitting either end to be used. In this way the surgeon has practically no weight to hold and can manipulate it with great gentleness. The tips are attached to the core, which extends one-half inch beyond the wire forming the coil, at an angle of 45 deg., thus allowing a free view of the field of operation, the connection being, as in the case of the smaller magnet, by shoulder and slot.

Through the courtesy of Dr. Knapp I was enabled to make some tests of the attracting power of this magnet as compared with the Haab, which is used in the New York Ophthalmic and Aural Institute. For this purpose very small particles of iron wire were used and the distance at which they were attracted carefully measured. This, of course, varied with the weight of the particle and its shape. In general it was found that where the Haab magnet started the body at a distance of five inches my magnet exerted the

same effect at a distance of three inches. While such tests are crude in the extreme they do, nevertheless, indicate something as to the relative powers of the two instruments.

While the Haab magnet is to-day the most powerful instrument at our command for the uses to which it is put, it has its drawbacks, first among which is the lack of portability; the patient must be brought to it and the head held in a proper position, which is not always a simple or convenient thing to do. Delicacy of manipulation is also out of the question. The great cost is in addition another though decidedly minor objection when the welfare of the human eye is concerned. For these reasons I think the larger of the two magnets which I have described may find a place in the ophthalmic surgeon's armamentarium. The smaller one also has its uses even in the presence of the larger one, or even of the Haab magnet, for instances are not uncommon in which it has been necessary to employ the hand magnet when the Haab has failed. The necessary data for making the magnets I have furnished to Charles R. Borne, manufacturing electrician, 53 Rose Street, New York.

CLINICAL CONTRIBUTIONS.

[THE BICYCLE AS A CURE FOR EXOPHORIA—PAPILLITIS OBSERVED IN THE PROCESS OF ITS DEVELOPMENT—ANIRIDIA TRAUMATICA—TRAUMATIC PARTIAL PARALYSIS OF THE OCULO-MOTOR NERVE—TWO CASES OF EXTRACTION OF A PIECE OF STEEL FROM THE EYE BY THE GIANT ELECTRO-MAGNET.]

BY DR. KASPAR PISCHEL, SAN FRANCISCO, CAL.

CASE I.—The Bicycle as a Cure for Exophoria.

K., H., aged forty years, merchant. *Diagnosis*.—Mixed astigmatism R E, hypermetr. astigmatism L E. Strabismus divergens alternans. *History*.—Eyes always turned out alternately. Could never see very well. *Correction of Refraction* under homatropia (final result).—R E, — 1.0 \subset cyl. + 5.25 ax. vert. $\frac{1}{18}$; L E, cyl. + 3.5 ax. vert. $\frac{1}{15}$.

Tenotomy of Left External Rectus.—After operation : In 50 cm, L E still turns out. In 5 m with red glass, homonymous diplopia. In stereoscope : sees with right eye only. Next day : Esoph. 2 prism dioptries ; 40 cm Esoph. 5°. In stereoscope : sometimes binocular vision. Stereoscopic exercises ordered.

When patient presented himself again, five months afterwards, L E turned out on perimeter 30° ; eyes sometimes straight ; stereoscope : occasionally binocular vision.

I proposed another operation, but patient objected. During the following seven months he took up *bicycle riding*, riding every day several miles on the slot which is in the centre of a cable-car track. He told me at his next call that his eyes felt better. I was greatly surprised to find the following :

With Maddox rod in 35 cm : orthophoria ; in stereoscope : generally binocular vision. Two months later : orthophoria ; stereoscope : binocular vision.

For this extraordinary improvement of the exophoria I could

not find any other explanation but the strengthening of the adduction by the daily exercise. In riding a wheel over a cable slot one has to concentrate one's eyes and thoughts upon the small strip in front of the wheel, which may have a strengthening influence upon the adduction, counteracting the exophoria.

CASE II.—Papillitis Observed in the Process of its Development.

R., E. V., thirty-one years old, masseur. *History*.—According to the report of Dr. M. Rothschild patient perfectly healthy. Five days ago noticed that sight of the right eye was not so good as that of the left. Since then sight of right eye steadily worse, so that to-day he cannot see anything with that eye. Has always been healthy.

Present Condition.—L E, Javal ophthalmometer shows 0.5 astigm.; vision: $< \frac{5}{15} + 3.0 < \frac{5}{6}$, reads $+ 2.5, \frac{1}{50}, \frac{6}{100}$; fundus normal. R E, candle; projection unreliable; fundus, nothing pathological to be seen; Javal, 0.5 astigm.

Treatment.—Kali iodat. Five days after first observation, no projection of light; fundus, some vessels on disk bent. Seven days after f. o., candle light not seen; electric light seen; no projection of light; fundus: disk dim, borders effaced, some swelling.

Treatment.—Inunctions of hydrarg. were added to K. I. Ten days after f. o. fingers in 10 cm; fundus: swelling of disk increased, hemorrhages upwards.

13 days: fingers in 10 cm; fundus same as last time.

15 " " " 20 cm.

20 " " " 20 cm; movement of hand in 2.5 m.

25 " " " 50 cm; fundus: swelling diminished; hemorrhages nearly all disappeared.

29 days: fingers in 60 cm, $< \frac{1}{30}$.

36 " " " 2.25 m, $\frac{5}{60}, \frac{1}{12}$.

40 " $< \frac{5}{30}, \frac{1}{9}$.

47 " $< \frac{5}{30}, \frac{1}{6}$.

61 " $< \frac{1}{9}, \frac{5}{60}$.

Treatment.—As the sight appears to be decreasing again, prescribed strychn. nitr. $\frac{1}{30}$ gr. pills; three pills a day.

89 days after first observation, $\frac{5}{30}, \frac{1}{6}$.

6 months after first " $< \frac{5}{21} - 10 < \frac{5}{15}$.

7 " " " " " $- 1.0 < \frac{5}{12}$; disk pale, borders sharp.

CASE III.—Aniridia Traumatica.

C. P., aged thirty. *History*.—Three days ago right eye was struck by an acorn thrown by a boy.

Status Præsens.—Vision : fingers in 1.5 m + 1.0 fingers in 2.5 m ; whole iris like a worm rolled up in bottom of anterior chamber ; lens dislocated downward ; upper periphery in centre of pupil ; some gray radii in lens ; many opacities in vitreous ; tension increased ; fundus normal.

Operation.—Iris removed, when a pearl of vitreous appeared ; patient kept in bed ; pilocarpin drops. *Thirteen days afterwards* : eyeball pale ; tension slightly increased ; a little blood in posterior surface of cornea ; in scar of limbus downward rest of iris ; in lens, especially in posterior capsule, opacities ; lens in normal position ; external border turned forward, rest of iris removed. *Twenty days* after operation : fingers in 2.5 m + 1.0 fingers in 3.5 m ; tension lower for last few days ; to-day higher.

Fifty-five days after : fingers in 2.5 m + 1.0 fingers in 3.5 m ; tension increased, after eserine diminished.

Seven months after accident : vision $< \frac{5}{20}$, tension slightly increased.

CASE IV.—Traumatic Partial Paralysis of the Oculo-Motor Nerve.

B., F., eighteen years old. An hour ago in stooping suddenly stuck a bill file into his orbit. *Right eye* : sight $\frac{6}{6}$, with $-0.5 \frac{6}{6}$. *Left eye* : just above inner canthus, in the middle between that and the eyebrows, small opening in the skin, 1.5 cm deep. Lid fissure 4 mm against 10 mm of right eye. Eyeball deviates outward 15° on perimeter. Pupil 6 mm without reaction against 3.5 mm of right eye. Sight : $\frac{6}{6} + 1.0 \frac{6}{20}$: reads with $+4.0 \frac{2}{7} \frac{6}{6}$. Fundus normal. Crossed double images in 4 m. In 65 cm distance image of left eye a little higher. Movement of eye impeded inwards and upwards in which direction the distance of double images increases. *Two weeks later* : Left eye : $\frac{2}{20}$ Hm. $1.0 + 4.0 \frac{2}{10} \frac{6}{6}$; Lid opening 7 mm against 9 of right eye : Pupil 5.3 against 3 mm of right eye, sees single. *Two months after accident* : Left eye : lid opening 9 mm against 9.5 mm of r. e. ; pupil 4 mm against 3 mm of r. e. ; sight : $\frac{6}{6} + 0.5 \frac{6}{6}$, reads $\frac{3}{10} \frac{0}{0}$, Esophoria 1. Hyperphoria of r. e. 1.

CASE V.—Two Cases of Extraction of a Piece of Steel from the Eye by the Giant Electro-Magnet.

1. F., A., aged twenty, stated that yesterday while he was

splitting wood a piece of an iron wedge flew into his left eye. Moderate pain since. I found : Ciliary and conjunctival injection ; from corneal wound gray stripe to iris wound ; cataractous lens ; Hypopium $\frac{1}{2}$ mm ; iris discolored ; no red light from fundus ; projection of candle-light good. Eye somewhat sensitive.

I told patient that the eye was probably lost because infection had already taken place. The magnet brought the foreign body quickly from the depth of the eye into anterior chamber. After some manœuvring the piece was extracted from the wound, into which a more pointed tip of the magnet had been introduced. The foreign body proved to be a leaflike, very thin, almost round piece of steel with notched edges, weighing one centigramme ($= \frac{1}{16}$ grain) and measuring 3 mm in diameter. Two days after operation : Panophthalmitis ; swelling of lid, pupil filled with yellowish masses, tension heightened. Therefore evisceration of bulbus. The whole eyeball was filled with yellowish matter. Uneventful recovery.

2. A. D., aged thirty-five, stated that a week ago when hammering an iron hoop of a fish barrel upwards something struck his right eye ; since then could not see so well ; eye had been irritated for two days only.

Condition on Presentation.—After atropia, sight : $+ 2.0 \frac{5}{13}$ Kerat ; image only slightly irregular. Slight ciliary injection ; pupil dilated ad maximum ; 2 mm below centre of cornea horizontal gray scar, 1 mm long. Similar brown scar a little outside of anterior pole of lens ; posterior pole shows gray cataractous cup ; fundus normal.

After cocaine, giant electro-magnet applied without result ; patient did not feel anything. Next day without cocaine patient sometimes felt a drawing pain while large magnet was applied on closed lids. After cocaine, large magnet applied from above drew iris upward toward centre, but the object attracted could evidently not pierce the iris ; therefore with triangular knife paracentesis from below. Small (Hirschberg —) magnet introduced could not pull away the piece from the iris. Pointed tip of large magnet introduced into wound drew piece into irido-corneal angle from which it was taken out by small magnet ; iris reduced ; eserine. Lens in lower half of anterior corticals shows now some gray lines radiating from the above mentioned scar of the anterior capsule, which now appears gray. Following day : one posterior synchia at spot of opacity of lens ; atropine. Moderate irritation.

The foreign body extracted was a small piece of iron, almost round, with one sharp point, weighing only 0.00062 gramme.

As the brown coloring of the scar in lens had disappeared after the extraction of the foreign body, I must assume that it was hidden behind it in the lens, which is corroborated by the appearance of the gray streaks in the cortical of the lens and the formation of a posterior synechia on that spot. The irritation passed off in a few days. Two weeks later: eye pale. Sight: $+1.0$
 $< \frac{6}{15}$.

CLINICAL OBSERVATIONS ON A CASE OF PARTIAL INCOMPLETE COLOBOMA OF THE IRIS.¹

BY DR. ARTHUR GLOOR,
ASSISTANT IN THE LABORATORY.

Translated and Abridged ² by MATTHIAS LANCKTON FOSTER, M.D., New York.

Congenital anomalies of the iris are not rare. Typical and atypical colobomata are frequently observed, irideremia appears now and then, anomalies in which the different layers of the iris are usually similarly affected. But those cases are of great rarity in which these layers are affected differently or in which only one is involved. The following case belongs to the latter class:

A girl, six and a half years of age, was brought to the hospital for advice regarding several deformities. Her mother had almost complete ptosis of the left upper lid, which had been operated on three times with only temporary benefit, and had limited motility of the left eyeball, except as regards the action of the abducens and the obliqui. A sister had had rhachitis. Otherwise the family history was negative.

Nothing abnormal in her appearance was noticed at birth. When two and a half years of age she had scarlet fever. At this time a discharge appeared from her right ear and then, according to her mother's statement, the right side of her face and especially the right upper lid became swollen and blue. This color soon disappeared, but the swelling, on the contrary, increased. The right auricle also became enlarged. During the last six

¹ Communication from the University Eye Clinic of Prof. Carl Mellinger in Basle.

² From vol. xxxvii., p. 159, etc., 1898, German Edition.

months an increase in size of all the enlarged parts had been visible.

On account of this history the patient was admitted to the hospital June 3, 1897, where she was under observation for a few days, during which no change in her condition and no indication for therapeutic intervention appeared. On November 12, 1897, her condition was still unchanged.

The right side of her face was more developed in all parts than the left and presented the appearance of having been shoved forward and downward, so that the approximately horizontal lines of the mouth and nasal apertures sloped precipitately downward toward the right. The right halves of the upper and lower jaws and of the tongue were also larger than the left so that their median lines appeared to be pushed over to the left. The malformation of the right ear was due to enlargement of the spina helicis and of the tragus, which appeared as thick, soft growths and almost occluded the meatus. The right foot was flat and considerably larger than the left, which was not flat. The legs 3 *cm* above the malleoli were of the same size.

The right upper lid hung loosely down over the eye, leaving only a small palpebral fissure 2 *mm* wide at its nasal end, a width which could be increased to 4 *mm* by exertion. In its temporal portion the lid was much thickened and partially overhung the lower lid. Its integument was unchanged and it was not sensitive to pressure.

The palpebral conjunctiva was normal. In the upper, outer part of the bulbar conjunctiva was a thickening with a rough, sago-like surface which could be felt through the lid. The eyeball was free from irritation.

The cornea was clear except on its upper and outer border where there was present a serrated, whitish cloudy zone about 1 *mm* broad, over which conjunctival vessels extended and ramified. This serrated opacity was apparently the result of a former inflammation.¹

The anterior chamber was of normal depth.

The bright gray iris, sprinkled with dark, brownish little spots, existed only as a peripheral ring bounded centrally by an irregular, serrated line. The dark, central space which appeared to be the pupil, occupied about two thirds of the vertical diameter of the

¹ [This closely resembles the condition sometimes present in imperfectly developed eyes and denominated by von Ammon "foetal ring." It is probably of developmental rather than inflammatory origin.—F.]

cornea, leaving less iris above than below, and reacted to light. By oblique illumination a dark-brown membrane could be seen to fill this space and to present a round space with sharply cut edges which also reacted to light,—the true pupil in its normal position. Through this the fundus of the eye could be examined while the membrane itself appeared as a perfectly opaque, black veil. The margin of the defect in the parenchyma of the iris presented spurs extending toward the centre, joined by slightly curved lines arching toward the periphery. By the aid of Westien's lens traces of two concentric folds could be seen in the lower-outer part of the iris, as well as radiating bands in the dark-brown membrane, the same as those described by von Ammon¹ and by Iwanoff and Arnold² as "radiating shallow folds which extend regularly in straight lines from the pupillary to the ciliary border. Their number amounts to seventy or eighty." Von Ammon states that these marks can be seen with equal clearness whether the pigment layer be or be not removed from the uvea. Probably this may be determined therefrom, that the uveal pigment layer is closely adherent to the lower surface of the iris so that it may follow the movements of the latter in contraction and expansion without suffering injury.

Ophthalmoscopically the media were clear and the fundus normal. The motility of the eye was good. The vision = $\frac{1}{10}$, not improved by glasses.

Left eye. Nothing abnormal was noticed internally or externally. The vision = $\frac{2}{3}$, not improved by glasses.

Under the influence of a mydriatic the pupils became symmetrically enlarged, the spurs in the margin of the defect were evened off, and the uveal layer could be seen by direct illumination only as a small, black, concentric band within the border of the iris. Inversely both the apparent and the true pupil became smaller after the use of eserine, which demonstrates that the uveal layer contains muscular elements. The outer pupil changes in artificial mydriasis and myosis so that the spurs, which in its natural condition project toward the centre, retract, while the curved lines between them now arch toward the centre. If the existence of a dilator pupillæ is assumed we can consider these spurs to be composed of groups of fibres of this muscle which by their natural elasticity contract strongly during paralysis of their antag-

¹ *Arch. für Ophthalmologie*, 1858, iv., p. 122.

² Graefe-Saemisch, *Handbuch*, i., p. 283.

onist in atropine mydriasis, and also contract during eserine myosis because they are irritated and induced to do so the same as the sphincter.

There was no trace of a coloboma of the choroid, retina, or lens. The anomaly was a complete irregularly ring-shaped absence of the connective-tissue layer of the iris about the pupil, in which the parenchyma approached most nearly to the pupil on its inner side. Following the example of Manz¹ we speak of this as a "Coloboma parziale incompletum seu superficiale," but the anomaly would be better described by the title "Aniridia partialis superficialis congenita."

Slight mention is made in modern text-books, or by authors who have written on colobomata, of such anomalies as this. There seem to be only six similar cases to be found in literature.

Von Ammon² described and pictured in his atlas a case observed by Dr. Schön, of Hamburg, of "congenital partial absence of the parenchyma of the iris with integrity of the uvea." This case bears the closest resemblance of any to the one herein described. The picture clearly shows the absence of the parenchyma of the iris downward and outward from the pupil, and the sepia-brown uveal membrane with its radiate striations completing the contour of the pupil.

Manz³ described a coloboma of the usual form directed downward in each eye, the point of which was covered posteriorly by the uvea so as to render the coloboma at that place incomplete.

Makroki⁴ observed a coloboma directed outward, ending near the ciliary border, with a rounded point, incurved margins, and radiating striæ posteriorly, rendered visible by oblique illumination.

In Reuss's⁵ case there was a dark, triangular space in the lower part of the iris, where the tissue was at a deeper level than the surrounding iris and presented no radiating striæ.

Treacher Collins⁶ reported a case of which *Nagel's Jahres-*

¹ Graefe-Saemisch, *Handbuch*, ii., p. 63.

² *Klinische Darstellung der angeb. Krankh. d. Aug.*, Tab. x., Fig. xix.

³ *Jahresbericht für Ophthalmologie*, 1876, p. 216.

⁴ *Ibid.*, 1881, p. 235.

⁵ *Ibid.*, 1886, p. 219.

⁶ *Ibid.*, 1892, p. 213.

bericht says in an abstract of his article: "The coloboma was half closed by a membrane which showed a double pigment layer on its posterior surface." The abstract of this article is not clear, and the original could not be obtained.

Bock¹ examined microscopically a pig's eye which presented a coloboma of the iris, ciliary body, and choroid, in which half of the portion of iris remaining peripherally from the coloboma was very thin, with perpendicular edges of demarcation. The tissue there consisted not only of the uvea, but of a tissue unusually rich in pigment.

Beyond doubt the malformations in this case were congenital. The statements of the mother to the contrary can hardly be credited. Immediately after birth such malformations would scarcely be noticeable on account of the small size of the organs, and it is quite possible that even if the enlargement of the right side of the face, for example, was present at birth it would become more apparent as the child grew. The condition of the eye itself was not noticed on account of the ptosis, and that the latter escaped the notice of the mother, who at least did not mention it, is not so very surprising when we remember that many striking symptoms, *e. g.*, otorrhœa, are frequently unremarked by mothers who are not negligent.

As regards etiology, the condition of the mother's eye suggests a hereditary tendency to such malformations. It is important to remember that in this case the anterior layer of the iris alone was involved. The lens, ciliary body, choroid, retina, and optic nerve showed nothing abnormal. It was in no way connected with, but must have been formed subsequently to the closure of, the fœtal cleft. If inflammation had been the cause, some other trace of its action should have been observable, which was not the case. The explanation may rather be the involvement of the missing tissue in the removal of the pupillary membrane, or in the non-development of a part of the parenchyma on ac-

¹ *Die angeborenen Colobome des Augapfels*, p. 55, Case xxi.

[To this list of cases should now be added the case of partial aniridia reported by Dunn, in the *Annals of Ophthalmology* for April, 1898, in which still less of the parenchyma remained. As in the present case, there was no evidence of the presence of a coloboma, in the usually accepted meaning of the term, and the radiate striations of the uveal layer were well marked.—F.]

count of faulty nutrition. The pupil of the uveal layer reacts promptly to the influence of mydriatics and myotics, hence elements of a sphincter pupillæ must be present. Whence do these originate? Evidently from the connective-tissue layer of the iris, for, according to Iwanoff and Arnold,¹ the sphincter is separated from the uvea only by a thin layer of connective tissue and the very delicate muscular tracts of the dilator. It may be that the iris became developed to a certain point, that then the process of absorption of the vessels of the pupillary membrane overstepped its usual bounds and produced the defect now present, while the sphincteric portion clung to the uveal membrane and was saved. But why the destructive process thus ceased cannot be told.

The other deformities present stand in some relation to the malformation of the iris. Whether it was the impulse of heredity or some other cause which occasioned these trophic disturbances is uncertain, but anomalies of the iris occur frequently with other inflammations of the body, as in the cases reported by Humphrey² and Ebenhardt.³

¹ Graefe-Saemisch, *Handbuch*, i., p. 283.

² *Jahresbericht für Ophthalmologie*, 1870, p. 213.

³ *Ibid.*, 1889, p. 190.

[Speculations on the etiology of these defects, based on the study of single cases, are seldom of value. Dr. Gloor favors the theory of involvement of the iris in the involution of the pupillary membrane, which was first suggested by Behr to explain the occurrence of irideremia and has since been proven not to be the cause, in all cases at least. Dr. Dunn attributed the condition in his patient to atrophy from pressure incident upon the glaucoma which was present. The true etiology can be determined only by a careful study of many more cases than have as yet been brought to our notice.—F.]

TWO CASES OF IRIDOTOMY UNDER DISCOURAGING CONDITIONS.

BY DR. F. M. WILSON, BRIDGEPORT, CONN.

(With a figure on text-plate IX.)

CASE I.—“Clinton B., age fourteen months, Sept. 30, 1886. Right eye pierced with scissors, one week ago. Wound in ciliary region, temporal side. Prolapse of iris and part of ciliary body. Prolapse cut off under ether. Eserine and pressure bandage.”

Dr. C. H. Beard, of Chicago, made the above notes while in charge at my office in 1886, and he also said “that right eye would undoubtedly go on to phthisis bulbi,” and that was the result. I saw the case at intervals up to May, 1888. The atrophied right globe was then quiet, and the left eye was normal. $L\ V = \frac{2}{8} \frac{0}{0}$. Then for five years I did not see him at all. But on Sept. 22, 1893, his father brought him to the office with plastic iritis well established in the left eye and vision down to $\frac{5}{2} \frac{0}{0}$. Atropine pushed to production of slight delirium had no effect on the total posterior synechia. Under ether enucleated the right atrophied globe. His vision slowly improved, and on Nov. 13, 1893, had come up to $\frac{2}{1} \frac{0}{0}$.

January 11, 1894, his vision was down again to $\frac{1}{2} \frac{0}{0}$. There was complete posterior synechia, exudation in pupil, opaque capsule, slightly diminished tension.

December 18, 1894, Dr. C. S. Bull saw him and advised operation “if good projection persisted after the lens became opaque.”

January 9, 1895.—His vision was down to large moving objects.

January 30th.— $L\ V = P\ L$; good field.

February 10th.—I attempted an iridectomy. The globe was soft, the iris atrophied, and seemed to be adherent to the capsule



Right Eye of Thomas Farrell.

Photographed by Dr. Leonard Waldo, June 2, 1898.

throughout its whole extent. I succeeded in getting out a few shreds of iris, but not enough to be called an iridectomy, and abandoned the undertaking.

From March, 1895, to October, 1897, this boy was admitted to the Bridgeport Hospital ten times, each time remaining about a week. At each visit, except one, a small straight knife (which the house staff for want of a better name call "The Baby Graefe"¹) was thrust through the cornea 3-4 mm from its margin, through the mat of tissues in the pupil, and *into* the lens. A single short sweep in one direction was made with the handle (trying to avoid the iris but sometimes cutting it), and the knife withdrawn. After each operation there was marked reaction. The iris became covered with yellow exudation, and the end seemed near, but the quick perception of light in all parts of the field persisted, and so we went on.

On the ninth visit I attempted a hook operation, but the mat of tissue was so firmly attached that I did not dare to use force enough to pull it out. Up to this point I am reasonably certain that no instrument had entered the vitreous, but at the tenth attempt I thrust the small knife well into the vitreous and made a little longer cut than usual. For the first time this cut "showed black." There was very little retraction of the lips of the cut at first, but this slit did finally open out into a broad oval pupil with the long diameter horizontal and about 4 mm in length. For several weeks after the last operation his vision did not exceed $\frac{1}{200}$ - $\frac{2}{200}$, but slowly improved, and six months later was $\frac{5}{200}$.

CASE 2.—Thomas Farrell, age fifty-seven, July 31, 1897. He tells me that about two months ago his right eye was "operated on for cataract," and that several days after the operation he got up in the night, and in stooping over hit the right eye against something so that he "saw stars."

Present Condition.—Right eye pulled up pupil. Slight ciliary injection. R V = P L; good field.

Left eye well established plastic irido-choroiditis. Pain for ten days. Ciliary injection. Discolored iris. Exudation in pupil and on iris. Almost complete post. synechia; lens cataractous. L V = large moving objects.

I watched this left eye for five months, but in spite of all treatment it got steadily worse. Sight was totally destroyed, and on

¹ Blade of knife is 13 mm long and as slim as it can be made and have high-grade edge.

January 12, 1898, I enucleated it. Two weeks later, on January 26th, with the small straight knife—"The Baby Graefe"—I did iridotomy on the right eye. The knife was entered about 3 mm from the temporal margin of cornea, and a central horizontal cut made in the pulled-up iris. This cut instantly snapped open into an oval black pupil, and there happened to be just enough tension to later pull this opening into a roughly circular form.

February 14, 1898.—His right vision $w + 10 D = \frac{2}{5} \frac{0}{0}$.

May 8th.—His right vision $w + 10 D = \frac{2}{5} \frac{0}{0} +$.

REMARKS.

We have here in the *first* case the unusual survival of an eye with sympathetic plastic inflammation, and the still more remarkable survival of the same eye after so much surgery (one hardly knows whether to be proud or ashamed after doing so many operations to one eye). It must be borne in mind, however, that the step from helpless P L to $\frac{5}{2} \frac{0}{0}$, and the ability to avoid obstacles, is a much longer one than from $\frac{5}{2} \frac{0}{0}$ to $\frac{1}{2} \frac{0}{0}$.

Another fact worth mentioning is that in this soft eyeball a horizontal slit through a mat of iris and inflammatory material, although it did not open at the time it was made, did finally widen out into a central oval pupil.

In the *second* case we have the unusual survival of an exciting eye after having destroyed its fellow-eye by sympathetic inflammation, and we also have the still rarer result of the preservation of good vision, viz., $\frac{2}{5} \frac{0}{0} +$. That this pupil is so nearly round is an accident of tension in the fibres of the pulled-up iris. The illustration from photograph taken June 2, 1898, shows how nearly central and circular the pupil is.

CLINICAL EXPERIENCE WITH HAAB'S POWERFUL ELECTRO-MAGNET.¹

BY DR. HERMAN KNAPP.

OUR experience with strong electro-magnets is still limited so that even a smaller number of cases may be worthy of publication. In America only a few observations on its use have been made known. These briefly summed up, as far as they have come to the notice of the writer, are the following :

Dr. J. A. WEEKS,² New York, describes a successful extraction of a chip of iron from the vitreous through the canal of entrance, which was at the corneo-scleral junction, without injury to the lens.

Dr. A. BARKAN,³ San Francisco, four cases.

I. Chip of iron from a horseshoe entered through the sclerotic. Extracted through the opening of entrance, twenty-four hours later. Suppuration. Enucleation. The foreign body evidently was infected.

II. Chip of iron, fastened in the cornea, projected into the anterior chamber. It was readily attracted by the magnet. Perfect recovery.

III. Chip of iron entered into the vitreous through cornea and lens. Extraction through the entrance canal. Recovery. The offending minute particle of metal was easily detected before the operation; it moved readily with the eyeball. Fundus clear and intact. Tn. V $\frac{20}{200}$. The first

¹ Communicated in abstract to the Section on Ophthalmology and Otology of the New York Academy of Medicine, March 20, 1899.

² ARCHIVES OF OPHTHALMOLOGY, xxvi., p. 85, 1897.

³ ARCHIVES OF OPHTHALMOLOGY, xxvii., p. 37, 1898.

closing of the circuit for ten minutes had no effect. Opening and then closing it again at once brought the foreign body into the anterior chamber, from which it was extracted by the tip of Haab's magnet introduced into the corneal wound. The details of this case are very instructive.

IV. Piece of steel entered and was extracted through the pericorneal space. On its way back it pushed the iris forward. After a small excision of the iris had been made, the magnet drew the piece out easily. Complete recovery. $V = \frac{20}{20}$.

Dr. Weeks¹ describes two other cases.

I. Penetrating wound of 3 mm, at the lower corneal margin. Small black spot seen at bottom of anterior chamber. Wound enlarged. Small magnet no effect. Large magnet elicited pain and made iris bulge. When, by a second incision, the wound assumed T-shape, the magnet drew out the foreign body. Recovery. $V = \frac{1}{8}$.

II. Wound, 6 mm long, in lid and ciliary region. Large magnet caused pain, slightly rotated the eyeball, but did not extract the iron. Later enucleation. A linear wound on temporal side of optic nerve occupied by the chip of iron, which measured 6.5 mm by 1 mm.

In another case of A. Barkan² a large piece of steel was successfully extracted, but the patient, a heavy drinker, died of delirium tremens.

P. A. CALLAN, in a paper, "The Haab Electro-Magnet as a Sideroscope,"³ details four cases:

I. Piece of iron entered into the vitreous through cornea and lens; iris intact. The presence of the piece of iron was recognized by a bulge of the sclerotic toward the point of the magnet. Patient refused operation. Three months later the patient was seen again, having a very irritable eye from irido-choroiditis.

II. Entrance through cornea, near limbus. White exu-

¹ *Transactions of the Section on Ophthalmology of the American Medical Association*, forty-eighth annual meeting, 1897, p. 56.

² *ARCH. OF OPHTH.*, xxvii., p. 181.

³ *Transactions American Ophthalmological Society*, vol. viii., part 2, p. 456, 1898.

date seen in vitreous from horizontal meridian to a dark mass at the bottom. Patient approached to the electro-magnet, felt acute pain, referable to the lower part of the globe. The foreign body, visible with the ophthalmoscope, was extracted through a scleral incision with the *small magnet* after several introductions. Its size 1 by 1.5 mm. On discharge, six weeks later, inflammation gone; fundus reflex can be gotten. V = fingers.

III. Chip of iron entered two months before patient presented himself. Cornea clear, iris irregular, synechiæ, cataract. Sight vanished ten days ago. Large magnet caused an abnormal sensation, and iris could be seen to bulge forward against cornea in superior-outer quadrant. Iridectomy, extraction of lens together with foreign body. In nine days eye quiet. V = 0.

IV. Chip of steel entered through lower part of cornea and iris. Lens cataractous in lower part. Electro-magnet, after a number of trials, caused the sclera below the cornea to bulge. Inflammation developed. Three days later incision in inf. temp. quadrant through sclera, followed by a few drops of vitreous. Tip of small magnet withdrew foreign body at first introduction. Panophthalmitis. Enucleation.

V. Entrance two weeks before presentation. Iritis. Cataract. V = 0. Operation, ether. Section with Graefe's knife one half of limbus. Extraction of lens with iridectomy. Exudate in vitreous visible. Small piece of iron extracted with small magnet. Globe tender; shrunken. V = 0. Enucleation refused.

Dr. CASPAR PESCHEL¹ of San Francisco publishes two cases, one successful, in the present number of these ARCHIVES, p. 155.

To the foregoing 15 cases, I can add 13 which occurred in my own practice since I had a Haab magnet put up in the N. Y. Ophthalmic and Aural Institute, May, 1898. I shall present the cases not in their chronological order, but in groups of similarity in kind.

¹ "Clinical Contributions," ARCH. OF OPHTH., vol. xxviii., p. 153, 1899.

FIRST GROUP: Foreign bodies visible in the anterior chamber; 2 CASES.

CASE 1.—Chip of steel in periphery of anterior chamber. Beginning iritis. Extraction by large magnet through entrance canal. Perfect recovery.

Mr. F. A. Goldthwaite, twenty-five years, N. Adams, Mass. While hammering iron, he felt that his eye had been hit. No particular pain, sight not materially impaired. In a week, while under treatment by a physician, the eye became somewhat red and painful. Then he came to Dr. Wright, of N. Adams, May 24, 1898. Dr. Wright told him that his was a case for a large magnet, an instrument not in his possession. He referred him to me, and the patient came to the clinic the next day.

When he presented himself the iris was discolored, the eye irritated, tearing. At the periphery of the anterior chamber, near the horizontal meridian, a small black spot was seen at and behind a small corneal wound with yellowish-gray borders. S normal. The patient's eye was cocainized, carefully moved to the tip of the Haab magnet, so that the traction line of the instrument was kept as far as possible in the direction of the corneal wound canal. When the tip was about 4 mm from the eye the black spot began to tremble, and when it came a little nearer to the tip it passed through the wound and flew to the tip of the magnet where it stuck out like a needle. It measured 3 by 2 mm. The patient had atropine instilled, kept his bed for a few days, and went home on the sixth day. $V = \frac{2}{3}\%$.

This is a case as gratifying as it is simple. It shows that the large magnet can draw out small foreign bodies through the wounds of entrance without dilating them. I dare say that in other cases a dilatation, even a T-shaped opening, may be necessary, but we should try first whether the foreign body will not come out through the opening it itself made. Lateral traction with the powerful magnet must be carefully avoided. The large magnet, to judge from the case under observation, seems to be particularly adapted to attract iron foreign bodies that have pierced the cornea with one end, but remain fastened in it with the other. These cases are difficult to manage with the ordinary instruments and do not always yield kindly to the

mild attractive power of a small magnet, as the following example will demonstrate.

CASE 2.—Piece of steel seen in anterior chamber ; attempts at extraction with small magnet unsuccessful. Hemorrhage. Foreign body disappeared, not indicated by large magnet. Eye blind.

Mr. D. Hunter, æt. twenty-five, New York. January 27, 1899, while he was hammering a nail, a particle struck and entered his left eye. No particular pain or dimness of sight. During the night pain began, not severe ; claims to have been able to see well then. On January 28th he went to an eye hospital, where the foreign body was seen lying in the anterior chamber. A corneal section was made down and inward, and the foreign body attracted by a small magnet, but attempts at removal proved unsuccessful. The foreign body lodged in the iris, was dislocated by the handling, and could not be seen again, as the eye filled with blood. Pat. was brought to the "Institute" by one of the surgeons of the other hospital. The eyeball was much injected, the anterior chamber full of blood. The large magnet did neither attract nor indicate the foreign body. The tip of the smaller magnet was introduced into the anterior chamber through the old corneal section, but without result. Eye bandaged, patient put to bed.

Blood absorbed and inflammation soon stopped. Another approach of the eye to the large magnet negative. Patient discharged February 10, 1899. February 18th, seen again. Anterior chamber free, iris torn above, and drawn downward, an opening also below. Vitreous full of blood. Tension normal, perception of light defective above and nasally. Enucleation refused.

This case is by no means isolated. Many a foreign body that pierced the cornea has fallen into the sinus of the anterior chamber and, aided or unaided, was buried in the head of the ciliary body, destroying by irido-cyclitis, the eye which harbored it, and in certain instances also the other by sympathy.

SECOND GROUP : Foreign bodies in the depth of the eye.

A.—Such as can be seen with the ophthalmoscope.

Of those I can offer here no example. The large magnet shares this field with the small. A few very gratifying examples of cure with the latter occurred in my former practice;

a successful one was operated on two months ago at the N. Y. Ophthalmic and Aural Institute by Dr. R. O. BORN.

B.—Cases where iron foreign bodies are surely within the eye, but are not indicated by the magnet.

CASE 3.—Chip of steel entered through cornea, pupil, and lens, not indicated by magnet. Enucleation. Small piece stuck in sclerotic near optic nerve.

Albert Capelle, æt. forty-eight, New York. Entered clinic, May 13, 1898. Left eye struck with a piece of steel from a chisel, April 26, 1898. The piece passed through cornea, pupil, and lens. Irido-cyclitis. $V = P L$. The eye was held before the magnet, brought in contact with tip at cornea and surrounding sclera; nowhere the patient felt pain or any other sensation. Enucleation, May 13, 1898, eighteen days after the injury. The globe held before the magnet was attracted and suspended when the tip was at a certain point near the optic nerve. This point was marked by a small black spot, the foreign body.

CASE 4.—Piece of a nail in eye eighteen years. Eye quiet, some sight left. Then irido-cyclitis. Hypopyon of 2 mm in height. Siderosis. Examination with large magnet negative. Enucleation. Globe adhered to magnet at lower part.

Mathew Bele, æt. fifty-one, New York. According to patient's statement a piece of nail entered the eye, eighteen years ago. No reaction followed, the eye was perfectly white, quiet, with some sight left, until ten weeks ago, when it became painful, inflamed, and sightless. **On admission**, there was a corneal scar near nasal margin, marked ciliary injection, iris rust-colored, pupil closed, a scar in nasal part. White sediment of 2 mm at bottom of anterior chamber. Field defective in upper part. Patient when the eye was brought in contact with the magnet had no sensation of pain. **Enucleation.** The globe was attracted and suspended when the tip of the magnet was brought in contact with the lower part of the sclerotic, just behind the ciliary region, and nowhere else. This proves that the foreign body was of iron and so tightly adherent to the lower wall of the globe that the magnet could not dislodge it. The recovery from the enucleation normal.

In order to determine the nature of the sediment in the anterior chamber, I made a small paracentesis, gathered a few drops of the muddy aqueous, made cover-glass specimens of them, charged some gelatine tubes with them, and inoculated a rabbit's eye after removing the lens. All these tests for bacteria were negative. The cover-glass specimens showed nothing but leucocytes and granular detritus.

CASE 5.—Subacute purulent irido-choroiditis from chip of iron in eye, not indicated by magnet. Enucleation. Globe attracted by magnet after enucleation.

Jos. Papooz, æt. twenty-five, Poughkeepsie, N. Y. Entered November 14, 1898, two weeks after the injury. Was in hospital in Poughkeepsie, left because enucleation was insisted on. Came to have all means tried before having eye removed. The eye showed a plain picture of purulent irido-choroiditis. Repeated trials with magnet negative. Enucleation, November 19, 1898. Magnet attracted the enucleated globe.

These three cases are parallel observations and instructive, exemplifying the well-known fact that the largest magnets at our command are not powerful enough to move foreign bodies which are firmly imbedded in dense unyielding tissue. If they are small and in the posterior part of the eye they betray their presence in no way, but when they are larger or in the anterior part of the eyeball, the latter is attracted by the magnet, adheres to the tip when in contact, and shows a small bulge of the sclerotic on withdrawal from the magnet.

THIRD GROUP : Iron foreign body suspected. Examination with magnet negative. Recovery under expectant treatment.

Of this group I cite only one case as a representative example.

CASE 6.—Jas. Binny, æt. thirty, Passaic, N. J. Entered hospital November 30, 1898. Right eye struck with piece of iron four weeks ago. No immediate pain or marked impairment of sight. Five days ago pain set in and sight began to fail. Circumcorneal injection; cornea clear. Iris muddy; slight hypopyon. Cyst-like protrusion of wound. $V = P L$. No fundus reflex. Large magnet failed to indicate presence of foreign body. Patient put to bed. Eye bandaged; atropine. December 2d: Hypopyon disappeared, other symptoms ameliorated, no pain. Daily improvement; staphyloma flattened. Discharged December 18, 1898. $V = \frac{2}{3} \phi$. Seen March 20, 1899. Pear-shaped pupil, even scar, pupil and fundus clear, no discomfort. $V = \frac{2}{3} \phi$.

The negative result of the magnet examination giving the

indication for expectant treatment led in this case to the most gratifying result.

FOURTH GROUP: Iron foreign bodies indicated and extracted by large magnet.

CASE 7.—Foreign body entering through nasal part of cornea, iris, and lens; led around lens through temporo-inferior part into the pupil; extracted through small corneal section. Perfect and permanent recovery.

Fr. Liebschik, æt. forty-five, New York. August 10, 1898, while hammering, had the nasal part of his left eye penetrated by a chip of iron. Condition on **admission**, two days later: Corneal wound small, scarcely perceptible; in iris a larger wound. Lens opaque on nasal side. Background illuminable on temporal side; no details discernible. Counts fingers at five feet.

Operation.—The eye holocainized was approached to the large magnet first with the nasal side of the cornea. The patient felt some pain, but no foreign body made its appearance, nor was the iris bulging. Then the point of the magnet was directed toward the outer-lower side of the cornea. A bulge of the iris was at once noticed and with the magnet drawn from the periphery toward the centre, where the foreign body became visible at the margin of the pupil and adhered to the iris. A small downward corneal section was made, the bit of iris to which the foreign body adhered prolapsed, the foreign body was picked up with a small magnet, and the iris reduced. The chip was 3 *mm* long by 2 *mm* broad. August 20th, patient discharged cured, with a round central, movable pupil. Counted fingers at several feet. Later seen several times, cataract had not advanced; on the contrary, it had cleared up. When last seen, March 15, 1899, the opacity was reduced to a well-defined gray stripe running along the periphery of the nasal aspect of the lens. The remainder of the lens was transparent, the vitreous perfectly clear, the fundus as bright as in any eye. V = $\frac{2}{3}$. F and Tn. Pupil round and movable, though the iris was perforated on the nasal side.

This case exemplifies the method which Haab particularly recommends. The foreign body did not retrace the passage of entrance, but showed itself first on the lower-inferior side. As most foreign bodies in the vitreous lie on the lower wall, it is natural that they should first appear on the lower, lower-outer, or lower-inner part.

CASE 8.—Piece of steel entered eye through larger wound in cornea, iris, and lens. Extracted ten weeks later with magnet, when a corneal incision through an adherent scar had been made. Preservation of form of eye and perception of light.

Jas. Binny, thirty years, Passaic, N. J. Injury to right eye by a piece of hot steel, November 30, 1898. F normal; V = P L. **Admitted** January 11, 1899. At the junction of the middle and lower thirds an adherent scar. Opaque lens masses fill pupil and part of anterior chamber. No particular inflammation. When eye was moved to magnet up to $\frac{1}{2}$ inch patient experienced a painful sensation as from an electric shock. On further approach he felt a distinct pain and the iris bulged on outer-lower part. When eye was brought in contact with the tip of the magnet the latter on withdrawal would pull the eye a little forward. The patient was put on the operating chair, and an incision was made through the scar in the cornea, through which soft lens substance and a few drops of transparent vitreous escaped. The tip of the small magnet (of Hirschberg) was introduced 2 or 3 mm into the anterior chamber, but failed to extract the foreign body. The patient was then put again before the large magnet. When the cornea was about 1 cm from the tip the foreign body passed through the wound and flew to the tip, from which it projected like a needle. Recovery without inflammation. Patient discharged Jan. 17, 1899. Perception of light. Field normal. The chip was 6 mm long, 3 mm broad, 1 mm thick.

CASE 9.—Entrance through cornea and lens. Panophthalmitis in twenty-four hours. Chip removed immediately. Exophthalmus. Chemosis. Lids stitched together. Swelling soon diminished. Lower half of cornea sloughed. Enucleation. Scar in posterior part of sclera. Recovery.

Rudolph Tiller, æt. nineteen, Jersey City. Piece of steel in right eye from hammering September 5, 1898. Sight not immediately impaired; slept well. Pain next morning. Sight increasingly dim, entirely lost when he **presented** himself in the clinic at 2.30 P.M. Pupil clouded, S = 0. Panophthalmitis.

Operation.—Iris made bulging in lower-outer part. Downward corneal flap section. Iris prolapsed at once. Tip of Hirschberg's magnet introduced into anterior chamber, no result. When the eye was again brought near the tip of the magnet the foreign body suddenly leaped out of the corneal wound and stuck to the tip of the magnet with its long diameter straight forward. A

piece of iris was excised. On gentle pressure the soft lens matter almost entirely escaped. Soon the eye became more and more painful, the lids swelled enormously, marked chemosis, the cornea obscured; the eye was very prominent and scarcely movable; no purulent discharge. The eye had the picture of *orbital thrombosis*. Temp. 100.6° to 101.8° . Pulse 100. Ankle and shoulder joints somewhat painful. Large gland in left popliteal space. The latter symptoms disappeared in three days. The lids were stitched together over the protruding conjunctiva. Swelling soon diminished. Iris yellowish, lower half of cornea sloughed. The eye gradually shrank and on October 8th, thirty-four days after injury, it was **enucleated**, though the other eye was free from irritation. The eyeball, examined immediately after the operation, showed a scar in the posterior part of the sclera, evidently from a previous rupture. Explorations with the finger failed to detect a foreign body or anything else abnormal in the depth of the orbit. The recovery was without disturbance. Discharge October 11th.

This case is very remarkable. The foreign body measured only 5 mm by 3 mm. It produced panophthalmitis and total blindness in twenty-four hours. The eyeball became prominent, swollen, and stiff. Lids and conjunctiva swollen, rise of temperature, and acceleration of pulse, with slight and transient painfulness in joints. After enucleation a scar was discovered in the posterior part of the sclerotic, evidently produced by a rupture, the consequence of the injury. Blood and exudation probably extended through this rupture into the orbit and produced thrombosis of the orbital veins.

CASE 10.—*Hypopyon*; iritis twenty-four hours after injury, checked by extraction of foreign body. Posterior synechiæ detached with forceps. Foreign body with a string of ciliary processes extracted. Hemorrhage. Recovery with somewhat shrunken but quiet eyeball.

Jas. Parks, æt. forty-eight, New York. On August 31, 1898, while hammering an iron band around a piece of wood, he felt something strike his left eye, impairing sight at once. Some pain at night. Admitted September 1, 1898, 3 P.M., with circumcorneal injection and hypopyon of 3 or 4 mm in height. Pupil not dilatable, occupied high brownish-gray material, synechiæ all around, anterior chamber shallow. P L. Projection good. No tenderness on pressure.

Operation, September 1st. Atropine, cocaine; eye moved toward tip of magnet with centre of cornea. When the cornea almost touched the tip of the magnet the lower part of the iris bulged and a small black spot appeared in the hypopyon, which disappeared when the eye was moved away from the magnet. A small downward flap section of the cornea liberated the pus but made no foreign body visible. The small magnet, whose tip was introduced into the anterior chamber, had no effect. The iris was then seized with forceps and torn loose from the lens capsule. The eye was again moved toward the tip of the magnet. At a distance of 5 mm the lower part of the iris was seen bulging. On moving the cornea downward, the bulge in the iris moved upward, and when the tip of the magnet was held into the corneal wound, the foreign body, with a string of grayish-black soft tissue, in the head of which it was embedded, jumped to the tip of the magnet. Blood filled the anterior chamber and escaped through the section. The wound was cleansed and a spatula passed through it to stroke iris tissue back. During the whole operation the patient felt no pain. Pressure bandage. Rest in bed.

Moderate reaction, no suppuration. Blood remained in the anterior chamber for two to three weeks. No pain. Discharged September 16th, sixteen days after operation. Seen later, March, 1899. Eye somewhat shrunken, slight diminution of tension, pupil closed, iris lustrous. S $\frac{1}{2}$. No irritation. Other eye normal.

I have reported this case in full on account of some important symptoms:—

(a) The *chip of iron* was evidently *infected*, for it had produced purulent iritis with circular synechiæ in twenty-four hours. The *removal of the foreign body prevented the inflammation from developing into panophthalmitis*.

(b) A chip of iron was drawn by the magnet behind the iris, but could not be led into the pupil on account of the *posterior synechiæ shutting off the passageway*. Instead of making an iridectomy, as is usual in such cases, I succeeded in clearing the channel by making an incision into the cornea, through which I could introduce into the anterior chamber a pair of iris forceps with which the iris was severed from the lens capsule.

(c) The *piece of iron* must either primarily have lain in

the ciliary body or have been drawn thither by the magnet, for it *came out with a string of ciliary tissue attached to it*. Among the dangers inherent in the use of powerful magnets, the latter eventuality is considered one of the greatest. We should therefore be careful to avoid entangling the piece of iron in the loose tissue of the ciliary processes by directing the power line of the magnet toward the posterior pole of the lens, whence the foreign body by slow and careful movements of the eye can be led around the lens into the posterior chamber, and thence into the anterior through the pupil. If this road be obstructed, it can be opened by an iridectomy or, as in the above case, by corelisis.

CASE 11.—Infected chip of iron; purulent irido-choroiditis. Extraction of chip with loss of vitreous. Shape of eye preserved.

Theo. Costello, æt. thirty-seven, New York. November 28, 1898, while hammering, felt that a chip of iron had struck and entered his right eye, soon causing great pain and loss of sight. **Admitted** December 1, 1898. Infiltrated wound in cornea, vertical, 5 to 6 mm in extent. Cornea dull, circumcorneal injection, iris discolored, cataract.

Operation, December 1st. At first large magnet did not indicate a foreign body, but on the second application it made the iris bulge on the nasal side. The foreign body not moving toward the pupil, a horizontal corneal section was made at the junction of the lower and middle thirds. The tip of a Hirschberg magnet, introduced into the pupil, did not attract the foreign body. The large magnet, before which the eye then was held again, extracted the foreign body when the eye was almost in contact with it. Soft lens substance and some vitreous escaped. Iridocyclitis purulenta. Moderate shrinkage of eyeball. No irritation. Piece of iron 6 mm long, 2 mm broad, 1-2 mm thick. Other eye, Robertson pupil, no atrophy of optic disc, no history of syphilis.

On correcting the proof of this communication I may add two other cases which occurred a few days ago.

CASE 12.—Piece of iron entered through cornea and lens into vitreous. Extracted by leading it into lower part of posterior chamber. Keratotomy. Extraction with Haab's magnet. Patient doing well.

Mr. L. Wachtel was brought to the clinic by Dr. Chas. H. May, assistant visiting ophthalmologist to the Mt. Sinai Hospital, New

York, March 29, 1899. A piece of iron had penetrated into the right eye two days previously. The cornea showed a horizontal wound of 3 *mm* in its centre, and the anterior capsule of the lens a corresponding laceration. Lens cataractous. Pupil round, about 4 *mm* in diameter, under atropine. Perception of light and projection good. Foreign body not seen.

Operation.—Holocaine. Eye approached to tip of magnet, trying to draw foreign body out through entrance canal. No result. Then, under the supposition that foreign body, as usual, was lying at bottom of vitreous, the power line of the magnet was directed from the upper half of the cornea to the lower part of the equator of the eye. In a short time, after a few alternate openings and closures of the circuit, the lower part of the iris showed a bulge, but the foreign body could not be drawn into the pupil. When the current was interrupted, the bulge in the iris disappeared without a trace. The patient was then placed on the operating chair, a small section was made in the lower segment of the cornea, and the patient put before the large magnet again. On approaching the eye to the tip of the magnet, the bulge in the lower part of the iris reappeared, a black spot appeared at the edge of the pupil, and on further approach a piece of iron hung at the tip of the magnet. It was 4 *mm* long and 1.75 *mm* wide. The iris, which was slightly prolapsed, was reduced, atropine instilled, the eye bandaged, and the patient put to bed in the hospital.

March 30th.—The patient had insignificant pain during the night. Lens more swollen, iris adherent to wound, not protruding. No pain to-day. No inflammation.

CASE 13.—Chip of iron three months in eye. Irido-cyclitis. Sediment at bottom of anterior chamber. In nasal part of iris an indistinct black spot. After keratotomy iron extracted with Haab's magnet.

Mr. A. Rettinger, æt. 16, came to the clinic March 29, 1899, with marked episcleral congestion, dull iris, clouded pupil; in the nasal part of the iris an indistinct black spot was noticed; saw movements of hand, candle only in outer-lower part of field. He had been under treatment in two ophthalmic hospitals, eye becoming steadily worse. He said that in November, 1898, a piece of iron flew in his eye. Great pain. Sight gradually failed.

Operation.—The cocainized eye, approached to the magnet, became painful, and when further approached the black spot was

more conspicuous and advanced toward the surface of the iris. It could neither be drawn up nor forward. A vertical incision of about 5 mm was made into the cornea just in front of the foreign body. When the eye was moved to the magnet again, the black spot became more distinct and flew through the incision in the cornea to the tip of the magnet. It measured 5 mm by 3 mm. Atropine; bandage; bed; April 3d, no reaction; eye clearing.

The construction and use of Haab's magnet are sufficiently known, and, with the incident literature, described in detail by the writer in Norris and Oliver's *System of Diseases of the Eye*, vol. iii., p. 936, Phila., 1898.

In concluding I wish to draw attention to two papers on the subject:

I. EUGEN V. HIPPEL: "Über Netzhaut-Degeneration durch Eisensplitter, nebst Bemerkungen über Magnetextraction," *Von Gräfe's Archiv*, Bd. 42, Abth. 4, S. 151-206, 1896. The first part describes the degenerative changes in eyes harboring iron for a length of time; the second part details eight cases of iron foreign bodies in the eye, from Leber's clinic; one, not giving any indication with the Haab magnet, proved to be a piece of stone. Among the seven remaining cases attempts at extraction with Haab's and Hirschberg's magnets were unsuccessful in five, in one the piece of steel was extracted with Hirschberg's magnet and the patient recovered, though with great impairment of sight; the other, extraction with Haab's magnet, is so remarkable that I beg to quote it in abstract.

Case 6 (*l. c.*, p. 199). Andreas Holzschuh. Injury by splinter of iron. Patient comes to clinic at once. Wound in centre of cornea 3 mm long, cataract, foreign body not seen. Introduction of Hirschberg's magnet through the wound canal into the vitreous, unsuccessful. The next day the first application of Haab's magnet unsuccessful. Patient complains of some pain. In the second application severe pain, the foreign body, long and wide, hangs on the magnet. Hemorrhage into the anterior chamber. Smooth recovery, with $V = \frac{6}{18}$. The foreign body was drawn out of the eye by the channel through which it entered, *i. e.*, cornea and lens.

II. DR. SACHS, from Prof. E. FUCHS'S clinic. "Sideroscop und Electromagnet; ihre Verwendung in der Augenheilkunde," *Wiener klin. Wochensch.*, 1898, No. 43, and extract in Hirschberg's *Centralblatt f. pract. Aug.*, 1899, S. 61. The author reports 31 cases, observed during the last two years. In 20 the Haab magnet was applied immediately after the injury, and the patients were discharged with eyes free, or almost free, from inflammation. In 2 cases V was reduced to perception of light. Eight cases came later, on account of inflammatory symptoms, which were removed by the extraction of the foreign body. In 3 cases the successful extraction did not prevent the loss of the eye by subsequent inflammation. Dr. Sachs speaks of the use of the electro-magnet at Fuchs's clinic as follows: Chips of iron were removed with the electro-magnet of Haab either through the entrance canal or, where this was not possible, by leading them into the anterior chamber and extracting them after opening it. Haab's magnet has proved to be of particular service in cases where the piece of iron was in the vitreous. Its use is devoid of the following disadvantages: (1) opening of the vitreous chamber, (2) introduction of an instrument into this cavity, (3) the consequent loss of vitreous, and (4) the danger of infection. The utility of the electro-magnet in detecting the presence of foreign bodies in the eye is dwelt upon. Concurring with all these conditions and having followed the same methods in my own practice, I would not restrict myself to the two ways of applying the electro-magnet, but consider the method of removing iron foreign bodies through a new opening in the sclerotic preferable in particular cases. The prejudicial consequences of drawing iron splinters into the ciliary body are recognized by Haab and exemplified in my own series. The powerful electro-magnet is a new instrument, its advantages are demonstrated and appreciated, but it will require further study to find out all the benefit it is capable of bestowing, eliminate its dangers, and restrict or exclude its use when the smaller magnet, according to Hirschberg's or other models, appears preferable.

RESTORATION OF THE CONJUNCTIVAL CUL-DE-SAC IN A CASE OF TOTAL SYMBLEPHARON, BY MEANS OF THIERSCH SKIN GRAFTS.

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CASES of total symblepharon, in which there has been complete obliteration of the conjunctival cul-de-sac, are generally regarded as incurable. Even where the adhesions between the ocular and palpebral conjunctiva do not completely obliterate the sac, but are yet extensive, the results of operative interference are frequently unsatisfactory, especially if an examination be made some time after the operation. The connective tissue underlying the new lining has a tendency to shrink and as a result there are frequently changes which neutralize or minimize the good effects seen immediately after operation. This explains why so many operative procedures have been proposed, especially for cases of posterior symblepharon.

It is for these reasons that the writer has thought the satisfactory cure of a case of total symblepharon by the insertion of Thiersch grafts worth reporting. The eye operated upon presented complete adhesion between both upper and lower lids and the globe as a result of a burn from lime some years before. The symblepharon was so complete that lids and eyeball were kept in one position; the lids could neither be closed nor opened beyond the space represented by the free portion of the globe. As a result of such

exposure, the surface of the cornea had become dense and tough, resembling skin; it also presented a well-marked staphyloma due to ulceration following the original injury. The completeness of the symblepharon was not merely apparent; upon dissecting the lids from the eyeball during the operation, no traces of mucous membrane could be found in the fornix nor over any other part of the adherent area.

The report is rendered more satisfactory from the fact that the patient has been under observation for almost two years (more than twenty months) after the first operation, and there has been no shrinking nor modification of the good results originally obtained. The first operation resulted in a perfect cul-de-sac for the upper lid and this complete restoration still exists. The patient is able to wear an artificial eye and the object of operation has been secured. In the lower lid, the first operation restored the central half of the fornix; a second and third operation were needed to obliterate strong bands existing at the outer and inner canthi; remains of these bands still exist but do not interfere with the wearing of a prothesis. The lining of the conjunctival surface of the lids and fornices is smooth, soft, of an epidermoid character, but there is no desquamation and but little discharge.

The operation is not a new one, though the writer is unable to find any mention of a similar case in which the symblepharon was total and in which after a period of almost two years, the original successful result was maintained. Hotz¹ advocated the use of Thiersch grafts as a substitute for conjunctiva in extensive symblepharon, in trachomatous shrinkage, for enlarging a contracted conjunctival pocket, and in certain cases of pterygium, and gave an account of a number of operations in which such grafts were successfully employed.

In the writer's case, much of the success was due to the employment of an effective manner of keeping the grafts in place, immovably applied to the dissected and separated surfaces representing the previously obliterated sacs. This was accomplished through the use of a porcelain shell such as forms the basis of artificial eyes. One of these (Messrs.

¹ *Annals of Ophthalmology*, April, 1893.

J. T. and A. H. Davis of 127 E. 15th Street, kindly placed a number at the writer's disposal) was selected from a number made to fit this patient. Two large Thiersch grafts, shaved from the thighs, were applied over this shell, completely covering both surfaces, with the epithelial or free surface of the grafts towards the surfaces of the shell. Then by placing the covered shell in the dissected sacs, the grafts were applied; they were kept in place by stitching together the lids and applying a firm bandage.

The use of such a porcelain shell for the purpose of keeping the grafts in place was suggested by the good results obtained by Dr. Chambers of Jersey City; the latter presented a patient in whom a partial symblepharon had been successfully operated upon in this manner, the grafts being kept in place by an ordinary button covered with gauze, at a meeting of the Ophthalmological Section of the New York Academy of Medicine some two or three years ago. Subsequently Dr. Marple presented two similar examples of successful result by this method in partial symblepharon. In August, 1898, Morton,¹ of Minneapolis, recommended the use of a prosthesis after the grafts had been inserted and held in place by a line of sutures, and reported good results in several instances in which he had operated in this manner with the object of restoring the fornix for the retention of an artificial eye.

Regarding the technique of the operation, a few remarks in addition to the details given in the history which follows may be pertinent. The rules which obtain when Thiersch skin grafts are employed in other parts of the body also apply to those upon the eye. The inner part of the arm or thigh answers well for supplying the grafts. The part from which the grafts are taken should be cleansed for a day or two before the operation and then bandaged with sterilized gauze. Just before operating, after cleansing with soap, washing with sterilized water and then with ether, the selected skin is moistened with warm, sterilized salt solution (six tenths of 1 per cent.), and the blade of the razor is also kept wet with this solution. Two broad retractors are used

¹ *The Ophthalmic Record*, August, 1898.

to stretch the skin, and then with a very sharp razor held flat, by means of a see-saw motion, the very thinnest layer of skin is removed, only the epidermis and the tops of the papillæ being desired.

The grafts should be as large as possible and the combined grafts (two or three ought to be sufficient to line both upper and lower lids) should be about half again as extensive as the area to be covered, to allow for shrinkage. The grafts must not be handled; they are transferred from the back of the razor to the porcelain shell and spread out as smoothly as possible with the epithelial surface next to the prothesis; in this way, both surfaces of the shell are covered; a defect may however be allowed over the centre of the inner surface of the shell, corresponding to the cornea. It is important that the margins of the shell be well covered, so that a continuous surface is applied to the deepest part of the fornix. This is insured by applying the grafts so that they cover a part of one surface and then curve over the margin to the other surface of the shell. In one of the operations, the writer attempted to stitch the grafts with catgut passed through openings made in the porcelain shell; but this is unnecessary, consumes time, and thus jeopardizes the life of the graft. Limited success in one of the smaller operations is attributed to this circumstance.

The dissection of the lids from the globe having been completed so that the lids are freely movable and all bleeding of the divided surfaces stopped, the graft-covered shell is put in place, the lids stitched together, and a firm bandage applied; both eyes are included in the bandage.

If everything goes well, the bandage ought to be left undisturbed for five days. If there is severe pain or offensive odor, the bandage must be removed and the outside of the lids inspected. At the end of five days, the stitches are removed from the lids and the latter cleansed; but the shell is left undisturbed, if possible, for several days longer. At the end of eight days the shell may be removed. After this, the eye requires frequent irrigation with warm solution of boric acid; the shell must be returned after each irrigation and a bandage reapplied.

There is considerable swelling, redness, and some pain. The grafts at first look grayish, soft, and somewhat sloughy; but whatever has not been cast off in the discharges will probably take hold and form a satisfactory lining. After a month, the artificial eye can probably be worn.

At the present time, the lining of the lids operated upon presents a smooth, soft surface having the character of moist, delicate skin, but efficiently replacing the mucous membrane. It is whiter and denser than mucous membrane, but there is no desquamation and no more discharge than is met with in most cases in which an artificial eye is worn after enucleation.

In this case, the cornea was staphylomatous and presented a dense, opaque surface; there was barely perception of light. Hence the question of tolerance of the shell was not tested as it would have been with a transparent and healthy cornea. With a normal cornea, frequent examination of the eyeball would be, of course, imperative, and it would be better to have the shell made of transparent glass. The writer has not had, however, any experience with such cases. In the patients already referred to as having been presented at the New York Academy of Medicine, no injury to the cornea resulted from the wearing of the porcelain shell for a period necessary to insure adhesion of the grafts; but these patients had comparatively small symblephara.

The following is a detailed history of the operations which form the basis for the preceding lines:

Gertrude R., age thirteen, was admitted to Mt. Sinai Hospital on May 12, 1897. She gave a history of having had lime thrown into the left eye seven years before. She was under treatment for a time after the accident, but despite interference the lids became adherent to the eyeball, there was considerable inflammation, and after the immediate symptoms had subsided the cornea became clouded and sight was lost.

Examination upon admission: Both upper and lower lids are firmly adherent to the ocular conjunctiva, leaving merely the cornea exposed. The latter is staphylomatous, opaque, dense, and its surface dull and epidermoid. The lids cannot be opened or closed, and no movement of the eyeball is possible. The cornea is perfectly dry. There is barely perception of light.

Operation, May 20, 1897: Ether anæsthesia. Both upper and lower lids were dissected from the eyeball, going down quite deeply so that they were freely movable. The cavities thus formed were tightly packed with cotton so as to arrest hemorrhage. Two Thiersch skin grafts, each about one inch by one inch and a half, were taken from the arm. These were transferred from the razor to a porcelain shell with the epithelial surface next to the shell. They were smoothed out upon the shell in such a manner as to cover the entire shell; the two grafts met at a line corresponding to midway between the margins, so that when in place the margins of grafts would correspond to the edges of the lids. In this way, the margins of the shell were covered with a continuous layer. The bleeding having ceased, the graft-covered shell was put in position, the lids were sutured together with three silk sutures, and a firm bandage applied. Next to the eye, a heavy layer of cotton soaked in solution of boric acid was placed so as to keep the grafts moist. Both eyes were included in the bandage.

May 23.—The patient complaining of pain, the bandage was removed and the surface of the lids inspected. These were reddened and swollen, and there was a moderate amount of rather offensive discharge upon the dressings. Neither stitches nor shell were disturbed. Bandage was reapplied to the left eye.

May 25.—The patient complained of considerable pain. Upon removing the bandage, the lids were found red, very much swollen, and tense. There was considerable offensive discharge upon the dressing. The lid sutures were removed. The shell was not disturbed. Appearance rather unfavorable. Rebandaged.

May 27.—There is less swelling and redness. Considerable offensive discharge upon dressing. The lids were separated gently and the shell removed. The sac was irrigated and the shell reinserted. The grafts have taken hold, but look gray, soft, and sloughy. Eye rebandaged.

June 1.—The eye is irrigated three times each day, the shell removed, cleansed, and reinserted, and the bandage reapplied. Solution of boric acid, warmed, is used for irrigation. The grafts look better and the appearances are more favorable.

June 15.—The same treatment has been continued since last note. The upper lid is entirely free except a slight adhesion at inner canthus; this is loosened daily. The lower lid presents a number of firm adhesions which are also broken up daily.

June 25.—The upper lid is now entirely free. The lower lid

still presents a number of adhesions especially at the canthi. The shell is worn constantly. The eye is irrigated three times a day. A light dressing held on with adhesive plaster takes the place of a bandage.

July 20.—The upper lid is swollen and reddened and there is some pain. The eye is irrigated frequently and iced pads applied.

July 22.—Swelling of upper lid has subsided.

August 22.—Condition the same. There has been, however, more discharge. For this, solution of bichloride, 1 to 6000 was used for a time, and then solution of peroxide of hydrogen. As a result of these applications the discharge has become less in amount.

August 26.—Discharged. Examination on this day shows upper lid entirely free and movable. Lower lid adherent by means of strong bands at inner and at outer canthus. With the exception of these two spots, the grafts have taken hold. There is still a moderate amount of discharge.

September 29.—Readmitted to the hospital. Condition same as at time of last note.

September 30.—**Operation.** Ether anæsthesia. The strong bands at canthi were divided deeply. The shell was covered with Thiersch grafts corresponding to the separated area. The external canthus was divided so that the graft-covered shell could be applied with greater precision. External canthus stitched after shell had been put in place. Lids stitched together and eye bandaged after a moist pad had been applied. Both eyes included in the bandage.

October 3.—Patient complains of pain. Bandage removed and outer surface of lids cleansed. Shell not disturbed. Considerable offensive discharge upon dressing. Both eyes rebandaged.

October 5.—Bandage removed. Fetid discharge. Sutures removed from lids. Part of grafts upon dressing. Considerable redness and swelling. Shell left in place. Rebandaged left eye.

October 8.—Eye rebandaged daily and outer surface of lids cleansed. Considerable discharge. To-day shell was removed. The grafts have taken hold but not over the entire dissected area. Shell reinserted and bandage applied.

October 12.—Shell is causing pain; removed and smaller one inserted. The lower lid is now free except at inner portion where there is a large mass of granulation tissue. The eye is irrigated three times a day, the shell worn constantly and a bandage kept on. Granulations excised.

October 22.—Same as at last note. Discharge is abundant and somewhat offensive. There is still an adhesion at inner canthus.

November 10, 1897.—Discharged. Examination of the eye at time of discharge from the hospital shows the following condition: Upper lid free and well lined with epithelial surface. Lower lid free except at inner canthus. Moderate discharge which is no longer offensive. The shell is kept in place constantly, the eye irrigated several times a day, and a light dressing worn and kept in place with adhesive plaster.

July 5, 1898.—Readmitted to hospital. Upper lid free throughout its entire extent. Lower lid adherent at inner and at outer canthus.

July 7.—**Operation.** Ether anæsthesia. The adhesions of lower lid were divided and grafts placed upon shell and inserted as in former operations, except that catgut sutures were passed through grafts and through holes in shell to keep grafts in place. This consumed considerable time and did not seem to answer any better than in previous operations when this stitching to the shell was omitted.

August 2.—The course after this third operation was similar to that after the second. The result was an improvement. There is still a slight adhesion at the inner canthus and a very delicate one at the outer canthus; but these will not interfere with the proper retention of an artificial eye. Patient was discharged.

September 14.—Readmitted to the hospital for removal of the staphyloma and reduction in size of the eyeball to form a better stump. Condition the same as at last note.

September 15.—**Operation.** Ether anæsthesia. Abcission of staphyloma and evisceration of left eyeball.

September 17.—Grayish patch on inner surface of upper lid. This was caused by pressure of the retractor at time of the operation.

September 20.—Gray patch no longer visible. Shell placed in sac.

October 1.—Patient discharged. Examination at this time shows: Upper lid entirely free and covered with grafts which are soft, smooth, and form an excellent lining surface. Lower lid also lined in same manner. Slight cicatricial bands persist at inner canthus, but these are covered with skin and do not interfere with retention of prothesis. There is but little discharge.

March 17, 1899.—Patient is now wearing an artificial eye and

the cosmetic effect is good. The lining to lids has remained effective. There is the same freedom as existed at last note. There is but little discharge. The eyeball, reduced in size by the last operation, forms a good stump. The inner surface of the upper lid and the fornix are covered by a smooth, continuous layer of skin. The lower lid and lower fornix are lined by skin which is equally efficient but less smooth near inner canthus owing to the existence of slight cicatricial bands in this situation.

THE LAW OF LISTING AND SOME DISPUTED POINTS ABOUT ITS PROOF.

By CARL WEILAND, M.D., PHILADELPHIA.

(With two figures in the text.)

IT is a curious fact that Listing's law is so frequently quoted by most authors without their giving a hint as to its source or proof by the experimental evidence, as indeed Listing himself gave no experimental proof of it. There is, further, a great deal of apparent mystery connected with this law and the experiments, because the different authors often give very contrary statements about the explanation of the position of the after-images. Thus on studying Helmholtz and Le Count with reference to this question, years ago, the writer became somewhat bewildered and it was only after he found a new elementary demonstration for the rotation of the after-images according to Listing's law that the whole subject became clear to him. As others may have experienced the same difficulty the writer believes that a publication of this demonstration may be of benefit to others likewise. Another reason for writing this paper is the fact that lately Dr. G. Hay presented his views about this subject at the July meeting, 1898, of the American Ophthalmological Society.¹ The writer agrees on the whole with the statements made there, but it would seem to him that his proof lacks the mathematical precision and simplicity of which this subject is so much in need. For it is not only the general apparent rotation of vertical and hori-

¹ *Transactions American Ophthalmological Society*, vol. viii., p. 414, 1898; published also in the *Annals of Ophthalmology*, vol. vii., p. 545, 1898.

zontal after-images that we want to know, but also the exact amount of these rotations, in order to see whether they are in perfect agreement with Listing's law or not.

First, then, let us state the law of Listing: "*If the visual line is in any way brought from the primary position into any other secondary position, the rotation of the eye in the latter position is such as if the eye had been rotated around a fixed axis which is perpendicular to both the primary and secondary position of the visual line.*" We will now investigate what are the mathematical consequences of this law, accepting it as true for the present. Let us suppose that, as is generally the case in normal eyes, the primary position of the eye is such that the visual line in that position, with head erect, stands at right angles to the wall which is parallel to your face or rather to a vertical plane passing through a line joining the two rotation-centres of the eyes (Fig. 1).

Let in our diagram (Fig. 1) O be the centre of the right eyeball and O A be the visual axis in the primary position, so that the line O A stands perpendicular to the plane of the wall and gives the distance of the centre O in front of the wall, or here the plane of the paper. This plane of the wall or paper is parallel to the vertical plane, that goes through the line joining the two centres of the eyes. The eye may now look up and out at point B, so that the final position of the visual axis is given by the line O B. Listing's law demands that the final position is such as if the eye had rotated around line N P which is perpendicular to both O A and O B. Evidently line N P must be parallel to the plane of the wall, because it is perpendicular to O A, and it must further lie in the vertical plane that can be laid through the centre of the eye in the primary position. We will assume that this plane be fixed in the eye. Let us now draw in this vertical plane of the eye in the primary position the vertical axis R O M and the horizontal axis K O S. Of course as long as the eye is in the primary position these two axes are parallel to the wall as the vertical plane is parallel to the wall; but the moment the eye rotates around the oblique axis N P of Listing, the formerly vertical plane ceases to be vertical and begins to be inclined to the wall,

the visual line. It is clear, therefore, that a plane going through visual axis and former vertical (or horizontal) axis R M (or K S), must also go through the vertical (or horizontal) meridian of the retina. In other words, the vertical meridian, which carries the after-image of the vertical line in the primary position, lies, after the rotation of the eye around axis N P, in the plane B O M, and the former horizontal meridian of the retina, which carries the after-image of the horizontal line at A, lies in the plane K O B. It is evident, therefore, that the after-image of the vertical line must appear on the wall at point B in the line in which the plane B R M or B O M cuts the wall—that is, in line M B, and that it must be *ab*. For the same reason, the after-image of the horizontal line at A must appear at point B in the line B K, in which plane B K S or B O K intersects the wall; it must be *cd*. So much for the qualitative analysis of the phenomenon.

But now to the more important quantitative consideration. How much is B M or *ab* inclined to the vertical line *st* of the wall, and how many degrees does the after-image of the horizontal line *cd* deviate from the horizontal line *mn* of the wall? Or otherwise expressed, how great are the angles δ and δ' as indicated in the diagram? To find these relations, let us extend a plane through the two visual axes O A and O B, which plane must be perpendicular to line N P, as N P is perpendicular to both O A and O B in this plane. This plane cuts the plane of the wall in line L A B and the oblique plane G R S H in line O L. As line K M is parallel to N P it must be also perpendicular to plane O B L and therefore perpendicular to both the line L B and L O. Therefore the angles K L O and K L B are right angles. If, further, we call ϑ the angle which the oblique axis N P makes with the former vertical axis R M, then, as L O is perpendicular to N O, the angle K O L is also ϑ . Let angle K B L = γ . Now we have

$$\begin{aligned} \text{tang. } \gamma &= \frac{K L}{L B} \text{ and tang. } \vartheta = \frac{K L}{L O} \text{ or } L B \text{ tang. } \gamma = L O \text{ tang. } \vartheta \\ \text{or } \frac{\text{tang. } \gamma}{\text{tang. } \vartheta} &= \frac{L O}{L B} \quad (I) \end{aligned}$$

Now $L O B$ is a right-angled triangle, as the visual axis $O B$ stands perpendicular to plane $G R S H$ and therefore perpendicular also to line $L O$ in this plane. Again if we call ε the angle $A O B$, by which the eye rotated around the oblique axis $N P$, we observe that angle $B L O$ is also equal to ε , as $O A$ is perpendicular to $L B$. Therefore

$$\cos \varepsilon = \frac{L O}{L B}$$

and we have from (I)

$$\frac{\text{tang. } \gamma}{\text{tang. } \vartheta} = \cos \varepsilon \text{ and tang. } \gamma = \cos \varepsilon \text{ tang. } \vartheta$$

Now the deviation of cd from the horizontal line $mn = \delta$, equals $\vartheta - \gamma$, because angle $E B A = \vartheta$, as the reader will see from the diagram. We have now

$$\text{tang. } \delta = \text{tang. } (\vartheta - \gamma) = \frac{\text{tang. } \vartheta - \text{tang. } \gamma}{1 + \text{tang. } \vartheta \text{ tang. } \gamma} = \frac{\text{tang. } \vartheta (1 - \cos \varepsilon)}{1 + \cos \varepsilon \text{ tang.}^2 \vartheta}$$

Similarly we find

$$\text{tang. } \eta = \text{tang. } L M B = \frac{L B}{L M}$$

We have further in the right-angled triangle $L O M$, the right angle being $O L M$, the relation

$$\text{tang. } \vartheta = \frac{L O}{L M}$$

This gives

$$\frac{\text{tang. } \eta}{\text{tang. } \vartheta} = \frac{L B}{L O}$$

But as

$$\cos \varepsilon = \frac{L O}{L B}$$

we have

$$\text{tang. } \eta = \frac{\text{tang. } \vartheta}{\cos \varepsilon}$$

Now angle $\delta' = \eta - \vartheta$, and so we have

$$\text{tang. } \delta' = \text{tang. } (\eta - \vartheta) = \frac{(1 - \cos \varepsilon) \text{ tang. } \vartheta}{\cos \varepsilon + \text{tang.}^2 \vartheta}$$

These two formulæ are in perfect agreement with those given by Helmholtz ¹ that were derived by a higher method ;

¹ *Phys. Opt.*, second edition, p. 654.

but the writer gives his own proof here because it is simpler and more convincing to a mind less accustomed to the abstract proceedings of analytical geometry. If we measure the excursion of the eye from A to B, not by the two angles ϑ and ε , but in such a manner that the visual axis O A first moves up vertically to point E, which lies with B on the same horizontal line, and afterwards horizontally along line E B to the point B, thus describing successively first the angle A O E = α vertically and then the angle E O B = β horizontally, we may introduce these two angles into our formulæ for δ and δ' by considering that

$$\cos \alpha \cos \beta = \cos \varepsilon \text{ and that (because } \sin \alpha = \frac{E A}{E O} \text{ and tang. } \vartheta = \frac{E A}{E B} \text{ and}$$

$$\text{tang. } \beta = \frac{E B}{E O} \text{) tang. } \vartheta = \frac{\sin \alpha}{\text{tang. } \beta}$$

We thus obtain for the horizontal deviation

$$\text{tang. } \delta = \frac{\sin \alpha \sin \beta \cos \beta (1 - \cos \alpha \cos \beta)}{\sin^2 \beta + \sin^2 \alpha \cos \alpha \cos^2 \beta};$$

and for the vertical deviation

$$\text{tang. } \delta' = \frac{\sin \alpha \sin \beta}{\cos \alpha + \cos \beta}.$$

By the help of these two formulæ we are now in a condition to determine for each point of the wall the deviation of vertical and horizontal after-images from the vertical and horizontal lines of the wall. We are thus enabled to see whether Listing's law alone governs the [parallel] movements of the eyes. For if we find that the deviations of the after-images do not quite agree with those as determined by our formulæ, just given, then Listing's law has not been in force alone, but a rotation of the eye around the visual axis must have occurred also. This rotation around the visual axis is impossible by a rotation of the eye around the oblique axis N P according to Listing's law, because N P is parallel to the wall, and the rotation around it can never be decomposed into a partial rotation around an axis that stands vertical to it. Now what observations have been made here to test this law of Listing? Many authors have reported their experiments, but probably the most reliable are those made by Helm-

holtz on normal eyes, and given in his *Phys. Opt.*, 2d. ed., p. 622. They are represented in the diagram below (Fig. 2).

This figure shows at a glance how the after-images of the rectangular cross look distorted in different regions of the wall. If, for example, the eye, after gazing steadily for a time at the cross at *a*, looked at *n*, a point equally up and out for the right eye, the cross would look as twisted at *n* as the

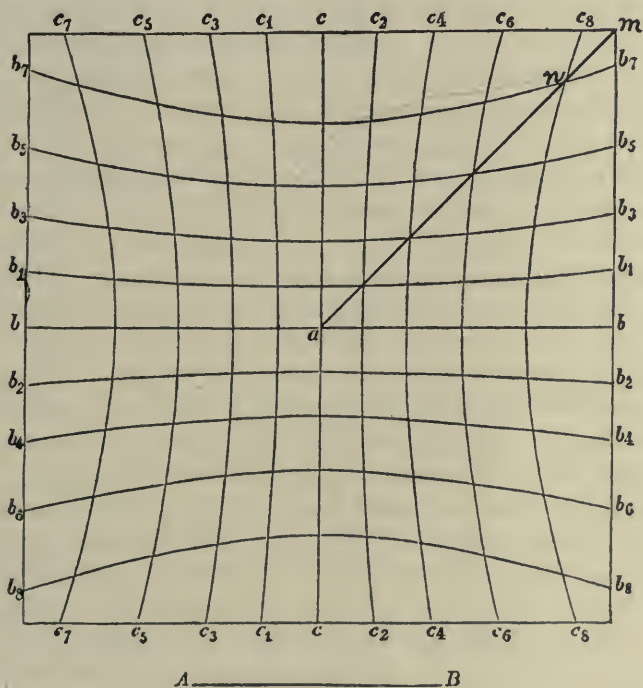


FIG. 2.

two lines b_7 b_7 and c_8 c_8 indicate. We have taken this particular look up and out, because in this case the oblique axis of Listing makes an angle of 45 degrees with the vertical, and our formulæ for the deviations become particularly simple. For as angle $\vartheta = 45^\circ$ we have $\text{tang } \vartheta = 1$, and therefore

$$\text{tang } \delta = \frac{1 - \cos \varepsilon}{1 + \cos \varepsilon} \text{ and } \text{tang } \delta^1 = \frac{1 - \cos \varepsilon}{1 + \cos \varepsilon}$$

This shows that the horizontal and vertical after-images become equally inclined to the respective lines on the wall.

If, with this knowledge we look at the latter diagram, we find that such is indeed the case; for all along line *am* the horizontal and vertical after-images have the very same deviation from the horizontal and vertical lines of the wall. At point *n* we find, by remembering that the eye was a relative distance equal to line A B off from the wall, that according to our formulæ δ and $\delta^1 = 14^\circ 31'$, while by careful plotting we find them to be about 15° . This is the same, because on this small scale the plotting cannot be done accurately enough not to allow of an error of one degree or so. It is thus clear that the normal eyes, from which Helmholtz plotted these curves, move exactly in accordance with the law of Listing—that is, that there is no real rotation of the eye around the antero-posterior axis, but only an apparent one, due to false projection. It must seem very strange, therefore, that Helmholtz in the text would only admit the rotation of the vertical after-image as due to false projection, while from the rotation of the horizontal after-image at *n* he inferred a rotation of the eye towards the *left*. We have shown, however, that by false projection the horizontal after-image must appear rotated also, and that the amount of rotation exactly corresponds to the law of Listing.

A similar objection must be made to Le Conte, who, in his book *Sight*, criticises Helmholtz. He thinks, p. 170, that “the verticals give true results, but the horizontals deceptive results by projection,” and he therefore infers for point *n* a rotation of the eye to the *right*. He gives a diagram, similar to Figure 2, in which for each point along line *am* of Figure 2 the verticals are much more inclined than the horizontals. This he explains by arguing that the verticals would be again vertical, and the horizontals would by projection be inclined much more, if not the whole eye had rotated, thus producing the deviation of the verticals and reducing that of the horizontals. But if such were the case there would be a decided discrepancy with the law of Listing; for we have seen that this law demands an equal inclination along line *am*. Nevertheless even Le Conte does not advocate a true rotation around the antero-posterior diameter in the parallel movements of the eyes. The only explana-

tion would seem to the writer to be that Le Conte's eyes, as is also confirmed by other experiments of his, did not quite follow Listing's law, but indulged in a slight rotation outward around the visual axis. It is evident then that in this special case Le Conte had no right to infer and accept Listing's law from his experiments, and it is just this discrepancy between the theory inferred, and the experiments performed, that first confused the writer and must startle the critical reader.

Furthermore, it is shown by Le Conte's exposition and also by that of Dr. Hay, that it is not sufficient to simply explain the peculiar twisted condition of the after-image of the cross, but that it is necessary that we should know the exact amount of the twisting. For it is easily possible that the torsion of the cross on the wall may be in the same direction as demanded by Listing's law, but still may not show the exact amount; in which case a rotation contrary to Listing's law must have occurred. Such deviation indeed occurs during the act of convergence, but it is usually only slight. On the whole, Listing's law describes well the movements of most human eyes, and it is very probable that this law is nothing but another expression of the idea of Wundt, that the eye moves into new positions with the smallest muscular exertion.

REPORT OF THE TRANSACTIONS OF THE SECTION
OF OPHTHALMOLOGY AND OTOTOLOGY AT THE
NEW YORK ACADEMY OF MEDICINE.

By DR. J. HERBERT CLAIBORNE, Secretary.

I.—OPHTHALMOLOGICAL PART OF THE MEETING OF
JAN. 16, 1899.

The President, Dr. PETER A. CALLAN, in the Chair.

The evening was devoted to the presentation of clinical material—cases and specimens—and to a paper on muscular asthenopia.

Dr. WALTER B. JOHNSON, of Paterson, N. J., showed a **portable magnet for removing iron foreign bodies from the interior of the eye**. It could be attached to the Edison electric street current. It possessed 140 ohms resistance. He demonstrated its value by attaching it to the electric current in the room. He had not made any quantitative experiments to test its attraction power. Dr. Noyes thought it was a little less powerful than the Haab magnet.

Dr. ARNOLD KNAPP showed a case in which he had operated for **extensive empyema of the frontal and ethmoidal sinuses with exophthalmos according to Jansen's method**. Recovery in four months. Published in full in the January number of these ARCHIVES.

Dr. A. KNAPP also showed a case of **blepharoplasty** operated on eighteen months ago. There had been artificial anophthalmos and cicatricial ectropion of the lower lid. A skin flap was taken from the temple and transplanted according to Fricke's method. The result was excellent cosmetically, and permitted the wearing of a prothesis.

Dr. A. E. DAVIS showed a case of **blepharoplasty for epi-**

thelioma of each lid of the left eye. A sliding flap was brought from the temple and split at its tongue so as to make two lids. The patient also had a keratitis which remained to some extent. The patient was an old man, and remained under ether for three hours.

Dr. RUDOLPH DENIG showed a case of **varicose veins of the orbit.** He referred to a similar case published by Dr. Gruening. Sometimes the varix is found behind the ball, sometimes above, and finally, on either side. His patient showed varices in other parts of the body. The varix here was above, just below the orbital ridge, and was about the size of an olive, soft (no bruit, no pulsation), and slightly increased in size on lowering the head, producing moderate enophthalmos. No heart lesion was found.

Dr. S. M. PAYNE showed a case of an **artery projecting into the vitreous humor.** It seemed to stop short of the posterior surface of the lens. It was quite dark at its apex and floated about with the movements of the eye. It turned upon itself, ran back to the disc. At first he thought it was a remnant of the foetal hyaloid artery. It occurred in a young girl.

Dr. WILBUR B. MARPLE showed a case of **Thiersch graft in the lower conjunctival sac** of left eye of a man fifty years old. The result was excellent. Operation was done on account of symblepharon.

Dr. E. S. THOMPSON showed a specimen of a **leukosarcoma** in gelatine. A surgeon who saw the case made a diagnosis of detachment; five months afterward the diagnosis was properly made and the eye removed. It was found to be a round-cell sarcoma with large nuclei and occasional spindle-cells.

In the *discussion* which followed the demonstration of these cases, Dr. NOYES said he had observed that skin flaps often became thickened and apparently lardaceous after plastic operations, but had not observed this in Dr. A. Knapp's case. He thought this to be unusual and fortunate and wished to know the experience of others in this matter. Dr. GRUENING said he had observed the same thing. Dr. NOYES remarked that he had noticed it in people under twenty years of age particularly. Dr. H. Knapp had seen the same thing, especially in the lower lids, and suggested slicing out the lardaceous hyperplastic material.

Dr. HENRY D. NOYES presented a paper on **muscular insufficiency** which he did not read in full. He selected several cases, the histories of which he read, as illustrations of the vagaries of

muscular asthenopia. He desired merely to give the Society his general impressions on the subject. He laid considerable stress on the necessity of repeated examinations to make an accurate diagnosis in each case. He said he had been silent on this subject for twelve years, but that at some future time he intended to publish conclusions drawn from several thousand cases. His remarks and conclusions on the occasion he intended to restrict to the horizontal group of muscles, ignoring entirely for the present the vertical and oblique groups. He said the majority of those present doubtless were aware of his views on the advantages of operating in certain cases of muscular asthenopia, and he wished to say that he was no less enthusiastic now in regard to this method of treatment, but at the same time he recognized that there were many cases in which nothing was of service, neither prisms, muscular exercise, nor operation. He believed that many of those cases had an hysterical and a moral side to them, and that several times he had seen cases finally recover only by the apparent exercise of moral strength in the individual. Such cases, in his opinion, had some of the color of faith cure.

He wished it, however, distinctly understood that he was a firm believer in, and advocate of, operating in many cases, and believed that this, and this alone, at times could relieve the symptoms. He called attention to the fact that Graefe was the first to study this subject, particularly in connection with myopia. His own experience dated back as far as 1865. He cited one or two cases illustrating the value of the use of prisms, and emphasizing the necessity of properly correcting all refractive errors before taking up the consideration of the muscular system. He referred to the great value of cocaine as a means of producing anæsthesia, enabling us thereby to examine the condition of the muscles during and immediately after the operation, and that these advantages had too often proved a temptation to unnecessary operations. He finds, however, that to-day he is more cautious and conservative in operating than he was formerly. He does not believe it possible to do a so-called "graduated tenotomy," and in the matter of advancement, he thinks great care should be taken. He thought it a matter of much regret that we do not have the chance to examine normal cases, that those people who consult an oculist have something the matter with them. Nevertheless, there are many with abnormal muscle balance who present no symptom of muscular asthenopia. He cited a case

in which there was for near work adduction power 20° and abduction 15° ; nevertheless, patient had no asthenopia. He worked all day in comfort. He merely found it disagreeable to look at passing objects out of a car window. Conclusions: no symptoms, no treatment. A lady, a patient of his, who had no asthenopic symptoms, but carried her head up and to the left, consulted him. He found 15° of vertical deviation. She had good health and did a great deal of work with her eyes. On examination, he found she had no stereoscopic vision; she had one-eyed vision. Conclusions: no treatment. Cited another case of a lady who had been operated on repeatedly, prisms and exercise had been tried, and without relief. She finally concluded that she was not doing her duty to herself by thinking so much about her trouble, made up her mind to get well, and did so. Dr. Noyes said this looked like faith cure.

He cited yet another case of a young man with violent symptoms of muscular asthenopia who was unrelieved by any measure, even tenotomies, which were rather hurtful. He was a clerk at Hampton, Va., and later a theological student. As soon as he graduated and was ordained, he commenced to improve, and finally recovered entirely from his asthenopia and picked up in weight, with no other measures than the correction of his refractive error and the use of prisms. Dr. Noyes cited a number of other similar cases. In concluding, he said that while he believed in tenotomy firmly in many cases, he nevertheless thought that the nature of every case, the personal surroundings and conditions and manner of life should be studied, and he called attention to the fact that these cases were found chiefly among the more intelligent classes of people, both those to whom near eye work is a luxury and occupation and among another large class of workers who, for their livelihood, need strong and capable visual apparatus.

In the discussion that followed Dr. Noyes's paper, Dr. GRUENING having been called upon to open the discussion, said that he was somewhat embarrassed in the discussion because, in the first place, he had not had any clear idea of the limit and scope of the paper beforehand, and in the second, because Dr. Noyes did so many things in the treatment of muscular asthenopia that he (Dr. Gruening) did not do. He found all the conditions that Dr. Noyes found, but rarely gave prisms, and rarely did tenotomies, in insufficiency. He did not think that the cases Dr.

Noyes had cited had borne out the claims he made in his prologue for the beneficial effects of operative treatment.

Dr. DUANE laid special stress upon the necessity of care in the diagnosis. All the factors that entered into a case should be got at, and the force of each in producing the deviation and the symptoms ascertained. This seemed a truism, but really was not, for it was habitually neglected, and this neglect was the cause of many disappointments.

In consideration of the variable character that such cases often displayed, he preferred to examine his cases repeatedly ; would not think of making a final diagnosis upon the strength of one examination, and certainly would not think, in any ordinary case, of doing an operation until it had been under observation and treatment for a month or more.

He quite agreed with Dr. Noyes that very considerable deviation might exist without causing symptoms or requiring treatment, and cited a case in which there was a hyperphoria of 8 with habitual binocular fixation, but in which, in spite of the enormous effort that this implied (an effort much greater than if there had been no attempt at binocular fixation), there were no symptoms of any account.

As regarded treatment, he supposed that all were agreed that the first and most important step to take was to correct the refraction. He personally regarded the determination of the refraction *under full mydriasis* as a most important part of the diagnosis, and always made a thorough trial of what correction of the refraction would accomplish before advocating other measures.

In many cases this alone would effect all that was required. In a certain number of other cases, particularly in neurasthenics, general treatment, tonics, change of air, etc., were necessary. In a few cases, mainly those of convergence-insufficiency, exercise with prisms was beneficial. As regarded prisms for constant wear, he considered their use in exophoria and esophoria as, in general, prejudicial, since they had in his experience a marked tendency to increase the deviation. He had seen a divergent strabismus develop out of a trifling exophoria by the use of prisms base in. For hyperphoria of the concomitant variety and not of very high degree, he had found prisms for constant use well borne and serviceable.

Finally, as regarded operations, he resorted to them only when other means had failed, and when, by a process of exclusion, he

was convinced that the symptoms were due to the muscular condition. Here, again, he thought disappointment arose from wrongly directed operations. The principle that he advocated was to *strengthen* weak muscles or reinforce weak action, and to *weaken* overstrong muscles or overstrong actions; doing an advancement in the former case and a tenotomy in the latter. Thus, in an exophoria due to a convergence-insufficiency (and several of the cases cited by Dr. Noyes appeared to be of this character), he would do advancement of the interni rather than tenotomy of the externi; whereas in exophoria due to excess of divergent action, tenotomy of the externi was indicated. Similarly, in esophoria due to convergence-excess, tenotomy of the interni would be the appropriate operation, while in esophoria due to insufficiency of divergence—and this variety was the cause of some of the most troublesome symptoms—he regarded advancement of the externi as the proper procedure.

In conclusion, he would say that he was not so pessimistic about these cases as Dr. Noyes had appeared to be. After deducting the cases which required no treatment and those in which correction of the refraction, tonics, and the use of prisms relieved the symptoms, there still remained a respectable proportion in which operation was indicated and in which the results of the operation were distinctly satisfactory.

Dr. H. KNAPP called attention to the fact that asthenopia diminishes with age. He thought Dr. Noyes's cases, as cited, showed this. He was accustomed to treat these cases in all the ways mentioned. He cited a case of insufficiency of the external recti in which he advised tenotomy of the interni, in the year 1870. The patient consulted Donders, who advised against it. The patient subsequently recovered without operation. He detailed the history of a lady patient of his who, in spite of two tenotomies, had preserved her asthenopia and esophoria, but ultimately recovered. The neurotic element in these cases should not be forgotten.

Dr. KNAPP said that in hyperopic esophoria he used only correcting glasses, as described by Dr. S. M. Payne.

The relief that so often comes with age is an argument in favor of + glasses.

Dr. NOYES closed the discussion. He said he had not yet given out the results of the cases that had terminated happily, but that he would do so at some future time. He did not agree with Dr.

Gruening, and cited one or two cases in which tenotomy did good.

On motion the meeting adjourned.

II.—MEETING OF FEBRUARY 20, 1899.

Dr. PETER A. CALLAN in the Chair.

Dr. H. KNAPP presented a **case of purulent cyclitis**. The patient was twenty-five years old, and at the age of five had had scarlet fever. One eye was inflamed with the result that a small ciliary staphyloma occurred at the nasal margin of the cornea. No further trouble resulted, and the patient had good sight until November 7, 1898, when the eyeball became very red and painful. On November 9th he consulted Dr. Knapp, who found yellowish infiltration of the protrusion and the pupil drawn to the nasal side. The iris was greenish-red, and the pupil responsive to light. There was a deposit on the anterior capsule, and the anterior chamber was deep; no reflex from the fundus, and the tension was T-1. V movements of the hand. The patient was admitted to the hospital and was treated antiphlogistically. Pupil dilated under atropine, and the reflex from the fundus was yellow. With oblique illumination a yellowish-white deposit was seen on the ciliary body all around. The eyeball enlarged greatly; the sclera felt very soft; the inflammation gradually subsided and the staphyloma flattened. In fact all irritation disappeared, and the eye gradually became smaller than the other. The yellowish-white deposit had remained and was easily seen. There was no vision, but irritation was entirely absent. Dr. Knapp said that, as cases of purulent choroido-cyclitis have no tendency to cause sympathetic ophthalmia, he had not advised the patient to have the eye removed, yet he cautioned him to keep his eye under observation.

Dr. H. KNAPP also showed a **case of cholesterinic degeneration of an eye from which a chip of steel had been extracted with a magnet ten years before**. The patient came to him two hours after a piece of steel from a chisel had entered the eye. A wound of 5 mm was found in the cornea. The anterior chamber was filled with blood, and there was faint perception of light. The next day a faint reflex from the fundus was seen. Three days later the anterior chamber was clear, but the foreign body was not visible in it, and the vitreous was cloudy.

Operation : meridional incision of the sclera between external and inferior recti. The foreign body was brought out on the fifth introduction of the electrode of Hirschberg's magnet. The wound was closed by conjunctival sutures. Bandage ; no reaction. The next day he counted fingers at ten feet. Soon after this there was hemorrhage into the vitreous and the vision fell to seeing the movements of the hand. Nevertheless he had no discomfort for ten years. During the last four months the eye has been red and tender and the upper lid drooped ; of late he has felt better again. On the occasion of the presentation the eye was red and full of cholesterine crystals, which formed a solid deposit 3 mm deep at the bottom of the anterior chamber, and were suspended in the anterior and vitreous chambers. T—1.

In the *discussion* that followed the narration of these cases Dr. WEEKS said he considered the first case of special interest, as belonging to the category of cystoid scars and incarcerated iris. He had operated on a case of cataract with the result of having an incarceration of the capsule in the wound. The anterior chamber was empty, but it closed later and a cystoid scar formed. The V $\frac{2}{3}$. Two years afterward the cystoid scar ruptured ; twenty-four hours later he saw the patient, and twenty-four hours after this there was plastic exudation in the anterior chamber, blocking the pupil. He gave mercury and potassium iodide. In ten days the vision had returned to $\frac{2}{3}$ and the patient went home, the cystoid scar having disappeared. He would be inclined to close these scars well.

Dr. W. E. LAMBERT presented a **case in which he had relieved a very acute attack of glaucoma, resulting from an extensive incarceration of the iris, by making an anterior sclerotomy**, using a Graefe knife. In making the section upwards he cut into the free margin of the iris on both sides, making practically a double iridotomy, and thus relieving the traction on the iris and ciliary body which seemed to be the cause of the glaucoma. The case originally was one of prolapse of the iris with fistula of the cornea, following a large perforating ulcer which had been cauterized. About six months after the cauterization, during which time the eye had been quiet, the glaucomatous attack supervened. The vision had been reduced to counting fingers ; it was now $\frac{2}{3}$.

Dr. J. E. WEEKS demonstrated a **case of partial atrophy of the optic nerves due to prolonged uterine hemorrhage.**

The patient, thirty-eight years old, aborted in March ; began to lose blood from the uterus May 10th ; the bleeding continued almost without intermission for five weeks and five days. Vision began to fail at the end of the third week of the hemorrhage, and the patient became " blind " in one week. Three weeks after the bleeding ceased, the vision was $\frac{1.8}{200}$ in the right eye and $\frac{2}{200}$ in the left. Good nourishment and tonic treatment have since been given, but vision has diminished and now is $\frac{7}{200}$ in the right eye and $\frac{1}{200}$ in the left. Central fixation is abolished and the fields of vision are much contracted.

Dr. J. H. CLAIBORNE showed a case of **operation for symblepharon**. A boy of nineteen had got lime into his right eye six weeks before, with the result that the lower cul-de-sac was practically entirely eliminated. The patient saw double in all directions except straight to the front and below.

Three suggestions presented themselves—the Thiersch graft, transplantation of rabbit's conjunctiva, and the procedure which was employed. Dr. Claiborne divided the symblepharon completely, rendering the lower lid perfectly free, deepening the cul-de-sac to its normal limit. Two strips of conjunctiva, parallelogram in shape, were dissected up over external and internal recti, so that each free end could be pulled down toward the median line and united by two sutures. This brought raw surface of the conjunctiva opposite the raw surface of the globe below, and presented to the raw inner surface of the lower lid the epithelial surface of the joined flaps. The joined flaps were then stitched to the lower lid by a double suture, transfixing the entire lid, and coming out on the skin side. These sutures were then tied. There was considerable lapping of the flaps over the cornea, toward the inner side particularly. Two weeks had elapsed since the operation. The cul-de-sac was much deeper, the patient far more comfortable, and there was no diplopia in any direction. Dr. Claiborne said that, while the operation had been moderately successful, he did not consider the result as good as he wished or as good as he thought might have been obtained by either the Thiersch graft or the transplantation of rabbit's conjunctiva. This case, as well as his past experience, had taught him that the Thiersch graft or the transplantation of rabbit's conjunctiva were the proper procedures in handling this class of cases, which at best he thought were difficult to deal with.

Dr. CLAIBORNE also presented a case of a woman of forty-eight

years, who had been **struck** on the lower lid of the right eye by **a buck-shot from a toy rifle**. Hemorrhage in the anterior chamber and irido-dialysis, but no fundus changes were present.

Dr. CLAIBORNE also presented **a specimen of melano-sarcoma** of the choroid in a young lady of twenty-eight years. She had noticed some indefinite trouble with her eye for six months. Latterly she had commenced to have photopsies and phosphenes. No pain at any time. She concluded she needed glasses, as she had always been very myopic. She placed her hand accidentally over the right eye in order to test her vision, when she observed for the first time that she could see all objects in the lower part of the field but not in the upper. There was a large blur there. She went to an optician who sent her to an eye surgeon. He diagnosed malignant tumor and advised enucleation. Dr. Claiborne saw the case afterward and on examination diagnosed leuko-sarcoma of the choroid on account of the white appearance of the tumor. The tumor appeared to be about the size of a small filbert, and was situated below—apparently quite near to the ciliary region. It was distinctly yellowish-white by reflected light, and several small coterics of blood-vessels were seen on it. To the right the retina could be seen slightly detached. Immediately enucleation was suggested, and the eye was removed in three days. The recovery was uneventful, and an excellent stump resulted.

Subsequently Dr. A. T. MITCHELL, the former House Surgeon of the New Amsterdam Eye and Ear Hospital, examined the eye and found the tumor to be a melano-sarcoma.

Dr. WARD A. HOLDEN read a paper on the **pathology of the amblyopia following profuse hemorrhage and of that following the ingestion of wood alcohol, as determined experimentally** (published in extenso at the beginning of this number).

In the *discussion* which followed Dr. Holden's paper Dr. WEEKS referred to the experiments of Kussmaul and Tenner in 1857, in which they produced anæmia of the spinal cord by ligating the abdominal aorta, causing paraplegia. Also to the experiments of Ballet and A. Dutil (*La Semaine Méd.*, 1897, p. 346), who produced transient anæmia of the cord by pressure on the abdominal aorta of the guinea-pig, causing transient paraplegia in pressures of five minutes, and permanent paraplegia when pressure was prolonged. Afterward the neurons of the cord were examined and showed degeneration, the chromatophil disappearing first, the

spongioplasm next, and the nucleus last. The anæmic conditions brought about in the cord by the experiments of Ballet and Dutil are analogous to those produced in the retina by pressure on the globe (vision temporarily abolished), mild or profound quinine anæmia, transient or permanent blocking of the arteria retinae centralis, and anæmia from loss of blood. In connection with the study of the changes in the retinal neurons as a result of anæmia, the very important question of prognosis forces itself upon us. The experiments of Ballet and Dutil go to prove that if the destruction of the neuron does not extend to the spongioplasm, but only affects the chromatophil, the neuron may recover—anæmia of twenty or thirty minutes or perhaps longer. In conditions producing anæmia of the retina we may consider the prognosis to be very bad, so far as the return of vision is concerned, if the anæmia does not pass in from three to twelve hours at the most.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE THIRD
QUARTER OF THE YEAR 1898.

By DR. ST. BERNHEIMER, IN VIENNA ; DR. O. BRECHT,
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WITH THE ASSISTANCE OF

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kow ; Dr. KRAHNSTÖVER, Rome ; Dr. P. VON MITTELSTÄDT,
Metz ; Prof. DA GAMA PINTO, Lisbon ; Dr. RICH-
ARD SCHWEIGGER, Berlin ; Dr. SULZER,
Paris ; Dr. L. WERNER, London ;
DR. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

Sections I.-III. Reviewed by PROF. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

301. SNELLEN. Thirty-ninth annual report of the Utrecht
Eye Hospital, 1897.

302. GUNNING. The institution for eye patients in Amster-
dam. Report for 1897.

303. WESTHOFF. The charity polyclinic in Amsterdam. Re-
port for 1897.

SNELLEN (301) treated 6513 patients and made 638 operations,
69 for cataract.

GUNNING (302) saw 11,267 patients and made 271 operations,
31 for cataract.

WESTHOFF (303) saw, in 1897, 1600 patients, 234 having trachoma, and he made 12 cataract operations.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

304. DALÉN. Experimental investigations on disinfection of the conjunctival sac. *Reports from the eye clinic of the Medico-Surgical Institute in Stockholm*, Jan., 1898.

305. BULLOT. On the degeneration of corneal epithelium after enucleation. *Ann. d'ocul.*, cxx., p. 46.

306. HERTEL. On the effects of cutting the optic nerve in young animals. *Graefe's Archiv*, xlv., 2, p. 277.

307. STÖWER. On the histology of the healing process in wounds of the sclera. *Graefe's Archiv*, xlv., 1, p. 65.

308. CAMPOS. A note on the variations in the diameter of the pupil after ligation of the internal jugular vein. *Arch. d'opht.*, xviii., 7, p. 454.

309. BONDI. Two unusual cases of congenital megalophthalmus. *Wiener med. Presse*, 1898, No. 26.

310. BULLOT. A cyclopic eye. *Ann. d'ocul.*, cxx., p. 43.

311. VAN DUYSE. The pathogenesis of cyclopia. *Arch. d'opht.*, xviii., 8, 9, pp. 451, 581.

312. SCHMIDT. On the detection of copper in the tissues of the eye after copper foreign bodies have remained in the interior. *Graefe's Archiv*, xlv., 3, p. 665.

313. VALLERT. On a case of injury with a zinc foreign body, with pathological investigations on the action of zinc in rabbits' eyes. *Ibid.*, p. 656.

314. VAN DEN BERGH. Theory of skiascopy. *Ann. d'ocul.*, cxx., p. 40.

315. DE FALCO. A new theory of the shadow in skiascopy. *Giorn. med. del R. esercito*, 1898, 6-9.

316. WEISS. On the discovery of foreign bodies in the interior of the eye by means of the Roentgen rays. *Ophth. Klinik*, 1898, 5, p. 88.

317. WEISS. Further reports on the use of Roentgen rays in cases of foreign body. *Zehender's klin. Monatsbl.*, xxxvi., p. 350.

318. HAMBURGER. A contribution to the manometry of the eye. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 257.

319. TSCHIRIKOW. On disinfection of the hands of the operator and his assistants. *Wratsch*, 1898, No. 35.

320. KRASSOWSKY. The effects of washing out the anterior chamber in the course of infected wounds of the anterior segment of the eye. *Inaug. Dissert.*, St. Petersburg, 1898.

321. BORTHEN. On the open-wound treatment of cataract patients. *Zehender's klin. Monatsbl.*, xxxvi., p. 280.

322. HJORT. On the open-wound treatment after eye operations. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 296.

323. SYKLOSSI. Subconjunctival injections of sublimate in the treatment of blennorrhœic conjunctivitis. *Ann. d'ocul.*, cxx., p. 1.

324. DE WECKER. The serum therapy in ophthalmology. *Clin. Opth.*, 1898, No. 11.

325. KNIES. On disturbance of color perception caused by santonin in persons with normal and abnormal color perception. *Arch. f. Augenheilk.*, xxxvii., 4, p. 351.

326. WESTCOTT. An additional case of double congenital microphthalmus. *Four. Am. Med. Assoc.*, Sept. 24, 1898.

In order to compare the effect of antiseptic cleansing of the conjunctival sac with aseptic cleansing, according to DALÉN (304), various investigators have determined the quantity of micro-organisms in the conjunctival sac before and after antiseptic disinfection, with very different results, owing to various sources of error. In order to avoid error as much as possible, Dalén compared the two eyes of the same individual, with normal eyes. One conjunctival sac was cleansed with sublimate, 1:5000, and the other with physiological salt solution. Both had an equal effect in diminishing the quantity of micro-organisms when the eyes were bandaged for 5-6 hours, but after the use of either, the quantity of micro-organisms was often increased when the eyes were bandaged for 12-24 hours. Other investigations made by the author were on the effect of bandaging on the micro-organisms in the sac, and the effect of iodoform. The micro-organisms most frequently found were the xerosis bacillus and the white pus coccus.

DALÉN.

BULLOT (305) removed some of the corneal epithelium of rabbits, and then, after enucleating the eye, introduced it into the abdominal cavity of the animal. The corneal epithelium retained its vitality for several months, and regeneration proceeded exactly

as it did when the eye was not enucleated. Leaving the enucleated eye for 7 hours in the air, or for 4 hours in warm physiological salt solution, did not impair the power of regeneration after introduction into the abdominal cavity. Putting the ball into hydrant water for 4 hours, or into boiled salt solution, or exposing it to hydrogen after washing in physiological salt solution, or leaving it for 4 hours in 1 % morphine solution, prevented the regeneration of the epithelium. A 2 % solution of morphine kills the epithelium, and it is cast off after the eye is introduced into the abdominal cavity.

SULZER.

HERTEL (306) cut the optic nerves of a number of young rabbits, carefully avoiding the retinal and the ciliary vessels. Following section of the nerve, the fibres in the bulbar stump and in the retina disappeared. Very gradually an atrophy of the ganglion cells took place. The nuclear layers were still normal after the lapse of a year, but the rods and cones showed degenerative changes after six months. In the central segment of the nerve, the atrophy advanced quickly to the chiasm, but beyond the chiasm its progress was slower. These eyes with the cut optic nerve still grew somewhat, but not so much as the unoperated eyes.

Making a number of experiments on rabbits' eyes, STÖWER (307) finds that the healing process in wounds of the sclera takes place principally from the episclera and from the choroid. The more a wound in the sclera gapes, the less likelihood is there of the formation of a sufficiently resistant scar. A prolapse of the choroid, or the turning in of conjunctiva or muscle, favors the later development of ectasia, as does also increased tension during the healing process. In cases of fresh scleral injury, any prolapse must be excised and the conjunctiva sutured.

CAMPOS (308) cut the cervical sympathetic, after which the 7 mm pupil contracted at once to 5 mm. Ligating then the internal jugular, the pupil contracted 2 mm more. Excitation of the upper end of the sympathetic caused a dilatation of 5 mm.

V. MITTELSTÄDT.

BONDI (309) describes two cases in which the eyes were abnormally large. There was no pathological change, but a congenital anomaly of ocular growth, without congenital changes elsewhere in the body. All parts of the eye were enlarged, but there was no disturbance of function.

BULLOT (310) demonstrated a cyclopic eye, having a cornea

larger than the cornea of a normal child. The pupil is double, and each side has a coloboma corresponding to a coloboma of the choroid, which ends at the optic disc. There are two lenses, and a single retina arising from the rudimentary optic nerve which consists of a union of the two primary optic nerves. SULZER.

VAN DUYSE (311), in the part of his paper which has appeared, represents, by numerous drawings, the findings in 9 cases of cyclopia, in order to show at what place the union of the two ocular protons occurs in producing a cyclopic eye. It appears that the junction occurs always, to a greater or less extent, at the contiguous retinal clefts. In every case, therefore, at the place of union, were colobomas of the choroid, retina, and nerve sheath. (Conclusion to follow.) V. MITTELSTÄDT.

SCHMIDT (312) had the opportunity of examining an eye injured by a gun-cap. He found that copper had been diffused in solution throughout the eye. Ferrocyanide of potassium and hydrochloric acid gave in sections of the eye a marked copper reaction, more intense near the seat of the foreign body.

VALLERT (313) introduced particles of zinc into the interior of the eye and found that an inflammatory exudation was formed about the foreign body; the vitreous became denser, and there was retinitis, with or without detachment. In phlogogenic effect zinc stands between silver and lead, but nearer lead.

The theory of skiascopy shows how dangerous it is to present optical problems in description rather than by the algebraic formula or the geometrical demonstration. VAN DEN BERGH (314) points out the error to which this has led. He calls "unit of rapidity" (of the shadow movement) the breadth of the patient's pupil through which the shadow moves in a "unit of time." This definition allows him to express geometrically the relative rapidity of shadow movement, which he does with diagrams.

SULZER.

WEISS (316) reports two cases in which the presence of a foreign body was determined by means of the Roentgen rays.

HAMBURGER (318) was able to show with a new manometer devised by him that absolutely the same tension exists in the anterior chamber and in the vitreous of rabbits, and that marked changes in tension in one chamber were almost immediately equalized.

A series of experiments led TSCHIRIKOW (319) to the following conclusions: The most careful mechanical cleansing of the

hands and washing with green soap and hot water for ten minutes did not entirely free the hands from micro-organisms. Dipping the hands in formol 5 %, permanganate of potassium 5 %, or sublimate 2 %, after mechanical cleansing, also did not render them sterile. Scrubbing the hands for three minutes with alcohol 50-95 % made the hands quite sterile.

HIRSCHMANN.

KRASSOWSKY (320) injected staphylococcus cultures into the eyes of a number of rabbits and then performed paracentesis, iridectomy, or extraction. The anterior chamber of one eye of each animal was then syringed with physiological salt solution while the other eye was left for control. The results were as follows :

1. Syringing after extraction did not free the anterior chamber from the cocci, but these remained in the lens matter and the eyes were lost from panophthalmitis. After iridectomy, syringing reduced the violence of the succeeding inflammation to a mild iritis while iridocyclitis developed in the control eye.

2. In simple section of the cornea the micro-organisms were mostly removed by syringing and but slight inflammatory signs appeared.

HIRSCHMANN.

SYKLOSSI (323) made 158 subconjunctival injections of sublimate in 83 eyes with gonorrhœal conjunctivitis with very favorable effects on the corneal complications.

SULZER.

According to KNIES (325), santonin affects only the cones of the retina which, previously hyperæsthetic to violet light, then became anæsthetic to this light.

In WESTCOTT'S (326) case the orbit and lids were normal, but the eyeballs were much below the normal size. The corneæ were opaque at the centre and shaded gradually off into the sclera, leaving a clear ring between. Iris was faintly visible through cornea but the pupil could not be clearly made out. There was some vision present, for the child could get about after a fashion.

BURNETT.

III.—INSTRUMENTS AND REMEDIES.

327. DALÉN. On holocain and its effect upon corneal epithelium and on the healing of corneal sections. *Nord. med. Archiv*, 1898, No. 16.

328. WICHERKIEWICZ. On the absorbent action of iodide of potassium after cataract operations. *Wochenschr. f. Therap. u. Hyg. d. Auges*, 1898, No. 49.

329. ANTONELLI. On the recent model of the Javal-Schiötz ophthalmometer. *Ann. d'ocul.*, 1898, 1, 2.

330. OSSWALT. On periscopic glasses. *Graefe's Archiv*, xlvii., 2, p. 384.

331. EBNER. A portable apparatus for illuminating transparent text types and for ophthalmoscopic purposes, with remarks on the testing of acuteness of vision. *Münch. med. Wochenschr.*, 1898, No. 39.

332. KNIES. The chromatoscope, a convenient instrument for determining disturbances of color perception in the macula. *Arch. f. Augenheilk.*, xxxvii., p. 225.

333. BLOEBAUM. The operative use of the new aseptic galvano-caustic incandescent needles in certain eye diseases. *Wochenschr. f. Therap. u. Hyg. des Auges*, 1898, No. 48.

334. SCHULEK. Instruments and particularly capsule forceps for the Graefe cataract operation. *Ungarische med. Presse*, 1898, No. 42.

335. HINSHELWOOD. The use of holocain in ophthalmic practice. *Brit. Med. Fourn.*, Sept., 1898, p. 619.

336. EATON. A reflecting tropometer based on trigonometrical measurements. Preliminary communication. *Ophth. Record*, Sept., 1898.

337. MULLEN. The use of suprarenal-capsule extract in minor eye surgery. *Amer. Fourn. of Ophth.*, Aug., 1898.

338. STARKEY. The galvanic current for treatment of pterygium. *Fourn. Amer. Med. Assoc.*, Sept. 17, 1898.

339. COLEMAN. A report of some cases treated by electricity. *Annals of Ophth.*, July, 1898.

340. WOODRUFF. The de Zeng refractometer. *Amer. Journ. of Ophth.*, July, 1898.

341. RANDOLPH. Conclusions from clinical and bacteriological experiments with holocain. *Fourn. Amer. Med. Assoc.*, Sept. 24, 1898.

342. BAXTER. An arrangement for testing the obliques at a distance. *Ophth. Record*, July, 1898.

DALÉN (327) finds, contrary to the general reports, that holocain 1% affects the corneal epithelium even more than 4% cocaine does. But, as respects the delay in the healing of corneal wounds when

cocaine is used, he finds that neither cocaine nor holocain disturbs the healing. Holocain acts quicker in inflamed eyes, but cocaine has the advantage of contracting vessels and thus diminishing hemorrhage during operations. DALÉN.

OSSWALT (330) finds that in — lenses the meniscus or plano-concave glass is preferable to the biconcave, but that in + lenses the meniscus form has no advantages over the other.

SCHULEK (334) describes a number of instruments which he uses in cataract operations. His capsule forceps is of ordinary size, and is bent at an angle of 30° , 6 mm from its end. The branches behind the angle do not come in contact when the forceps is closed, thus protecting the iris. The entire end of the forceps is toothed with sharp teeth which point somewhat downward when the branches of the forceps are open but come together smoothly when the branches are closed. HERRNHEISER.

HINSHELWOOD'S (335) conclusions are that holocain has no other effect, except the production of anæsthesia, on the eye. It is not superior to cocaine except in the rapidity of action. It is also a powerful antiseptic. Solutions do not keep longer than a fortnight. WERNER.

EATON (336) has conceived a plan for measuring the excursion of the eyes subjectively, by the proper use of two parallel mirrors and a set of test objects which are reflected from those mirrors into the eye of the observer. The laws of trigonometry will give the amount of rotation from a primary position. This is only a preliminary communication and details of the construction of the instrument and its use are not given. BURNETT.

MULLEN (337) uses Armour's extract of suprarenal capsule in the strength of 5 grs. to a dram of boric acid solution. He has found it useful in producing ischæmia of the conjunctiva in the various operations on that membrane, after cocaine anæsthesia. The astringent effect lasts for from an hour to an hour and a half and is followed by no bad effects. BURNETT.

STARKEY (338) has tried electrolysis in the treatment of pterygia and he thinks with some show of success. In 50% the cure has been radical and in 20% the growth has recommenced at a later period. He uses a platinum needle introduced into the growth, the other pole held in the hand; strength of current 1 to 3 milliamperes; duration of sitting 1 to 2 minutes. BURNETT.

Among the affections of the eye treated by the constant current of electricity reported by COLEMAN (339) are optic atrophies,

opacities in the vitreous, and asthenopia. The anode is applied to the nape of the neck and the cathode over the closed lids for 5 to 10 minutes daily. He is satisfied that treatment was beneficial in most of the cases.

BURNETT.

From his experience with the de Zeng refractometer, WOODRUFF (340) deems it, on the whole, unsatisfactory and unreliable so far as astigmatism is concerned. It does not dispense with a cycloplegic; it is not a time saver and is expensive.

BURNETT.

RANDOLPH (341) had demonstrated by experiments that holocain in the strength employed in ophthalmic practice (1%) possesses distinct germicidal properties.

BURNETT.

BAXTER'S (342) apparatus for testing the obliques at a distance consists of two sets of Maddox rods, one before each eye, so arranged that they can be rotated. An indicator shows how much any given rotation may be. The images of the distant point of light, converted into lines, are separated by a double prism placed behind the frame bearing the rods. When the images are thus separated, if there be any fault in the obliques there will not be a parallelism of the two sets of lines as in a normal condition, but an obliquity of one or the other. The rotation of one or the other set of prisms necessary to bring about a parallelism will show the amount of deviation exposed in degrees. (Dr. G. H. Price, of Nashville, claims in the same number of the journal, that he suggested a similar method in 1894 at the San Francisco meeting of the Amer. Med. Assoc.)

BURNETT.

Sections IV.—VII. Reviewed by Dr. BERNHEIMER, VIENNA.

IV.—ANATOMY.

343. TERRIEN. Researches on the structure of the pars ciliaris retinæ and the origin of the fibres of the zonula. *Arch. d'opht.*, xviii., No. 9.

344. PERGENS. The pigmented spots in the negro's conjunctiva. *Ann. d'ocul.*, cxx., p. 42.

345. WIDMARK. On the location of the papillo-macular bundle. *Reports of the Caroline Med.-Chirurg. Institute in Stockholm*. Stockholm-Jena, 1898.

346. SCHOUTE. Vena vorticiosa in the posterior portion of the eyeball. *Graefe's Archiv*, xlv., 2, p. 357.

347. BERNHEIMER. Experimental investigations on the pupillary tracts. *Sitzungsber. d. k. Akad. d. Wissenschaften in Wien. Mathem.-naturw. Classe*, cvii., 3, May, 1898.

According to TERRIEN (343) the ciliary portion of the retina consists of two cell layers and the supporting fibres. He regards the inner layer of unpigmented cells (*pars ciliaris retinae proper*) as a continuation of the inner nuclear layer of the retina. The supporting fibres, according to his view, are attached to the lamina vitrea, pass through both layers of cells, and, ending in part on the surface of the cells, form the *limitans interna*. In part they pass out as fine fibres which become *zonula fibres*.

PERGENS (344) finds that the pigment which surrounds the cornea in the negro lies in the basal cells of the epithelium, and even up to the superficial cells. Venneman, however, believes that the pigment occurs only in stellate cells lying among the epithelial cells.

SULZER.

WIDMARK (345) had the opportunity of examining a case of tobacco retro-bulbar neuritis anatomically. He was able to trace the degenerated bundle through the optic tract to its entrance into the external geniculate body. The location of the bundle peripheral to the chiasm agreed with that which has previously been found. In the chiasm the bundle lies dorso-medial. Farther up in the tract it passed gradually outward. At the margin of the cerebral peduncle it reached the upper-outer limit of the tract. About the middle of the peduncle it came inward somewhat but still remained lateral, and this location was maintained to the end of the tract. In the anterior part of the external geniculate ganglion it lay dorso-lateral. The degeneration was most marked just anterior to the optic canal, which speaks against Nuel's view that tobacco amblyopia is due to a primary disease of the ganglion-cell layer of the retina with secondary simple atrophy of the papillo-macular bundle.

DALÉN.

BERNHEIMER (347) had studied the anatomical relations between optic nerve and oculomotor nucleus in embryo human brains, and in monkeys in which atrophy had been produced. Besides this, animals were examined as to pupillary reaction after section of one tract and after antero-posterior division of the chiasm. He concludes that (1) the visual fibres semidecussate in the chiasm; (2) the pupillary fibres also semidecussate; (3) the pupillary fibres run with the visual fibres through the tract, and only in the region of the geniculate bodies do they turn in toward

the median line to reach the sphincter nucleus, which lies in the anterior corpus quadrigeminum beneath the aquæduct; besides this connection of each eye with both sphincter nuclei there is a central communication of the two sphincter nuclei.

V.—PHYSIOLOGY.

348. BIETTI. On a new method of determining alterations in the color sense. *Annali di ottalm.*, i., 11, 1898.

349. PASCALE. The color sense in man. *Giornale medico del R. esercito*, No. 9, 1898.

350. WIDMARK. On the limit of the visual spectrum at the violet end. *Mitth. a. d. Augenlinik d. Karol. Med. Chirurg. Institutes zu Stockholm*, Jena, 1898.

351. PERGENS. The retinal chaos and its relations to the threshold excitability of the retina. *Ann. d'ocul.*, cxx., p. 98.

352. DRUAULT. On the production of colored rings about a flame. Description of a physiological ring. *Arch. d'opht.*, xviii., 5, p. 312.

353. SALOMONSOHN. On diffraction in the cornea and lens. *Arch. f. Anat. u. Physiol., Phys. Abth.*, 1898.

354. HESS. On the effect of the refractive index of the aqueous humor on the total refraction of the eye. *Monatsbl. f. Augenheilk.*, Aug., 1898.

355. HESS. Remarks on accommodation. *Graefe's Archiv*, xlv., 2, p. 440.

356. HESS and HEINE. Studies on accommodation. IV.—Experimental investigations on the influence of accommodation on intra-ocular tension, with remarks on accommodation in the mammalia. *Graefe's Archiv*, xlv., 2, p. 243.

357. HEINE. The condition of intra-ocular tension in accommodation. *Centralbl. f. Physiol.*, xii., No. 13.

358. KNIES. On a frequent but previously disregarded form of congenital violet blindness and on color anomalies in general. *Arch. f. Augenheilk.*, xxxvii., 3, p. 234.

359. TURNER. Experiments on the production of complementary color sensations. *Brit. Med. Jour.*, Sept., 1898, p. 777.

360. GOULD. A case of "mathematically perfect eyes." *Four. Amer. Med. Assoc.*, Sept. 17, 1898.

361. BREWER. Homonymous torsion, a position of the retinal meridians hitherto unrecognized. *Ophth. Record*, Sept., 1898.

362. PRATT. The rods and epithelial pigment layer of the human retina considered as a photo-chemical or sensitive plate. *Med. Record*, Aug. 27, 1898.

In view of the unsatisfactory results obtained in using the various instruments proposed for determining unilateral color defects by means of the binocular comparison of colors, BIETTI (348) has modified an apparatus of Gaudenzi's with which, when each eye observes a separate test object, the retinal images of the two are projected at one spot, and thus by comparing the two images any defect in color perception in one eye may be detected. In conclusion, the author cites three cases in which very accurate diagnoses of paracentral color scotomata were made.

KRAHNSTÖVER.

According to WIDMARK (350), the views entertained in regard to the sensibility of the retina to the ultra-violet rays differ considerably. Donders considered these rays invisible, Mascart thought that the retina was very sensitive to them. Widmark examined fifty-nine persons, using a grating spectroscope, and came to the following conclusions. The normal human eye perceives only a few of the ultra-violet rays, but the limit of the visible spectrum varies in different individuals, being usually, however, between L and M. The rays are visible directly and not through fluorescence. Older persons see fewer of the violet rays than the young, but in aphakic persons the limit of perception is extended.

DALÉN.

DRUAULT (352) describes a ring of spectral colors which appears when a person with dilated pupils looks at a light. It is due to diffraction in the lens and is partly cut off when a portion of the pupil is covered with a screen.

V. MITTELSTÄDT.

Many have explained a transient myopia in emmetropic eyes by supposing an increased refractive index of the aqueous humor. Computations made by HESS (354) show that if the refractive index of the normal aqueous (1.3365) be increased to 1.377 in an emmetropic eye, a myopia of only 1.7 D would be produced. These transient myopias can be due in part only to such a change in the aqueous, since to produce 1.5-2.0 D of myopia the aqueous would need to be of a refractive index equal to or greater than that of the cornea.

HESS and HEINE (356) have produced contraction of the ciliary

muscle by excitation of the ciliary ganglion, or by direct excitation through the sclera, in various animals, and have studied the tension of the accommodated eye. Accommodation in cats, dogs, and rabbits is rudimentary, amounting only to 1.-3. D, while in monkeys it is at least 10.-12. D. Accommodation has no effect upon intra-ocular tension.

KNIES (358) has already described an anomaly of color perception in which violet is not recognized while all the other spectral colors are seen properly. This form of color-blindness he finds to be very frequent, and after examining his patients more carefully he now discusses its relations to other forms of color-blindness.

TURNER (359) showed an experiment of Bidwell's: it consists of a rotating disc, which has a black surface, followed by an open space through which the color is seen, and following this a white area, on which the persistent retinal impression is seen. At a certain speed of rotation, the original color is not seen, but only the color complementary to it.

WERNER.

In GOULD'S (360) case the patient had recurring conjunctival hemorrhages. The eyes had been pronounced "mathematically perfect," but it was finally made out that he had a low degree of astigmatism — 0.25, 90° in right, 180° in left. A constant wearing of these glasses was followed by a cessation of the hemorrhages and other annoying symptoms.

BURNETT.

A study of the retinal meridians by means of his torsionmeter has shown BREWER (361) that the vertical meridians in a normal condition are perpendicular to the horizon and parallel, yet there are exceptional conditions, of which he relates several, in which these meridians, though still parallel, are inclined either to the right or left, sometimes as much as 6°. This will cause us to modify our ideas of the vertical horopter as given by Helmholtz.

BURNETT.

PRATT (362) advances the idea that the rods and hexagonal cells of the retina secrete the photo-chemical substance which is acted upon by light, and this action is transmitted to the cones which are the true percipient elements.

BURNETT.

VI.—REFRACTION AND ACCOMMODATION.

363. TROMBETTA. The determination of astigmatism. *Giornale med. del R. esercito*, 1898, No. 4.

364. SCHEFFELS. On the final results in the operative treatment of myopia. *Zehender's klin. Monatsbl.*, xxxvi., p. 337.

365. JENNINGS. A case of hyperopic astigmatism changing to mixed astigmatism after tenotomy of the internal recti muscles. *Ophth. Record*, Aug., 1898.

TROMBETTA (363) presents Martin's statistics, according to which a large percentage of all eyes are astigmatic. He then takes up the various methods of determining astigmatism. The use of the ophthalmometer he commends most highly as being the quickest, most accurate, and most convenient method. In low degrees of astigmatism retinoscopy is the most accurate, but in the author's opinion the ophthalmoscopic determination should always be used for control. KRAHNSTÖVER.

In JENNINGS'S (365) case the refraction before the division of the interni for esophoria of 8° , was $R + 1, 120^\circ$; $L + 1, 60^\circ$. After the operations, which were successful in removing the esophoria, the refraction was found to be $R - 1.5 \subset + 2.5, 105^\circ$; $L - 0.5 \subset + 2.5, 75^\circ$. No report of an ophthalmometric examination is given. BURNETT.

VII.—MUSCLES AND NERVES.

366. PANAS. Pathogenesis and treatment of functional strabismus. *Arch. d'opht.*, xvii., 7, p. 401.

367. SMITH, PRIESTLEY. Tenotomy for strabismus; a simplified operation. *Ophth. Review*, xvii., p. 101.

368. FITZGERALD. Some anomalies of the ocular muscles. *Brit. Med. Four.*, Sept., 1898, p. 699.

369. MOORHEAD, G. SIMS. Post-diphtherial paralysis. *Ibid.*, p. 593.

370. PERCIVAL. A case of acquired nystagmus. *Ibid.*, June, 1898, p. 1583.

371. STARR, E. G. A method for determining latent hyperphoria. *Annals of Ophth.*, July, 1898.

Concomitant strabismus, according to PANAS (366), is a functional disturbance of convergence which is almost always of peripheral origin and, therefore, requires operative treatment of both eyes. Panas recommends operation at the age of seven to nine, as soon as non-operative treatment has proved to be fruitless. He prefers tenotomy to advancement, the latter being used only in high degrees of divergence. Panas operates in narcosis and stretches the muscle, before dividing it, by passing the squint hook under it and then turning the eye outward until the inner

margin of the cornea reaches the outer commissure. Of 210 cases of convergent strabismus the position of the eyes was corrected at once in 180, while a slight convergence remained in 30, but in none did divergence occur. In conclusion, the author presents a historical sketch of the various views on the development and treatment of squint.

V. MITTELSTÄDT.

PRIESTLEY SMITH (367) makes a horizontal incision along the lower border of the tendon, hooks it up, and then catches it with a clamp forceps, something like Prince's, just behind the hook. The latter is then withdrawn and conjunctiva and tendon divided in front of the clamp. The central needle of the suture is passed through the tendon and conjunctiva in the usual way, behind the clamp, and the piece of tendon included in the clamp is cut off. Before passing the sutures in front, the author tunnels under the anterior stumps of the tendon and superficial layers of sclerotic with a keratome.

WERNER.

FITZGERALD'S (368) subject was a man *æt.* twenty-six. In the left orbit a muscular slip arose from the tendon of origin of the external rectus and passed inwards, blending with the centre of the internal rectus. In both orbits a slip arose from the tendon of origin of the lev. palp. sup., passed inwards under the superior oblique, and divided into two portions, one of which joined the front of the lev. palp. sup. and the other attached itself to the frontal bone below and in front of the trochlea.

WERNER.

This paper (369) treats at length of diphtherial paralysis in general. Of the oculomotor paralyse the bulk occurred between the fourth and seventeenth days, none before the fourth; one case occurred as late as the ninety-first day. The author was satisfied that antitoxin had no power of setting up paralysis by itself.

WERNER.

PERCIVAL'S (370) patient developed vertical nystagmus from running the eyes up and down the pages of a large book; there was slight hemeralopia. The room in which he worked was well lighted.

WERNER.

A method which STARR (371) has found most satisfactory for discovering any latent heterophoria is to exclude one eye absolutely from vision and light by means of a patch or blinder, for a period of twelve hours. Upon removal of the blinder he finds that the latent heterophoria has become manifest.

BURNETT.

VIII.-XII. Reviewed by PROF. SILEX, Berlin.

VIII.—LIDS.

372. ANGELUCCI. A new operative procedure for inflammatory and senile ectropium of the lower lid. *Rev. génér. d'opht.*, xvii., p. 385.

373. STEINHEIM. Epicanthus with ptosis, and heredity. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 249.

374. BERGER, H., and LOEWY, R. A new operative procedure for epicanthus. *Arch. d'opht.*, xviii., 6, p. 453.

375. ROGMAN. A case of hyaline degeneration of the lids. *Ann. d'ocul.*, cxx., p. 89.

376. ARGYLL-ROBERTSON. Note on a method of operating for ectropion of the lower eyelid. *Brit. Med. Jour.*, June, 1898, p. 1504.

377. FALLOWS. Case of polypoid growth from a Meibomian cyst. *Ibid.*, Sept., 1898, p. 620.

378. NEVE. On the surgical treatment of cataract. *Ibid.*

379. CHEATHAM. Sclerodermic papilloma of the lower lid. *Annals of Ophth.*, July, 1898.

ANGELUCCI (372) in inflammatory ectropium separates the skin and the orbicularis from the tarsus of the lower lid, thus dividing the lid into two layers. After this dissection the anterior layer of its own accord assumes its proper position, and the tarsus slips downward and remains there without requiring to be held in place by sutures.

SULZER.

STEINHEIM (373) reports the case of a family in which in the course of five generations epicanthus and ptosis were noted fifteen times.

In a girl of sixteen, BERGER and LOEWY (374) corrected a bilateral epicanthus by excising a triangular flap of skin on each side between the bridge of the nose and the fold. The excision of crescentic and elliptical flaps was also followed by good cosmetic results.

V. MITTELSTÄDT.

In an otherwise healthy man of fifty-five, ROGMAN (375) found a marked enlargement of the tarsus of the left upper lid, which had remained unchanged for years. The skin was normal and, like the conjunctiva, was movable over the tarsus. The lids of the other side exhibited smaller tumors of the same nature. Microscopic examination of excised bits showed that it was a case of hyaline

degeneration of the lids. In spite of the long continuance of the hyaline degeneration there was no trace of amyloid degeneration.

SULZER.

ROBERTSON (376) makes a flap with a broad base which lies close to, and parallel with, the outer half of the lid margin and extends in a curve upwards external to the outer canthus. This flap is dissected up and a wedge-shaped piece cut out of the lid margin. The flap is then drawn up, until the lid is in position, and sutured higher up.

WERNER.

In CHEATHAM'S (379) case a man had a burn on the lower lid by a piece of hot metal. Some years after, a tumor appeared on the conjunctival edge of the lid. It was excised and found to be a sclerodermal papilloma.

BURNETT.

IX.—LACHRYMAL APPARATUS.

380. AXENFELD. On the histology and physiology of the lachrymal musculature. *Report of Heidelberg Ophth. Soc.*, 1898; *cf. Arch. f. Augenheilk.*, xxxviii., 1, p. 116.

381. SUK. Two cases of dacryocystitis opening in an unusual direction. *Wiener klin. Wochenschr.*, No. 25, 1898.

382. BUSINELLI. Phlegmon of the orbit consecutive to phlegmon of the lachrymal sac. *Clinica moderna*, iv., No. 30.

383. PARISOTTI. Polyp of the lachrymal canal. *Bull. della R. Accad. med. di Roma.*, ii., iii., 1898.

384. MITVALSKY. Actinomycosis of the lachrymal sac. *Arch. d'opht.*, xviii., 8, p. 508.

SUK (381) found in the literature only five cases of dacryocystitis opening backward and causing phlegmon of the orbit. In two further cases a slight injury of inflamed tear passages led to infection of the orbit, and later of the cranial cavity. He records two cases of his own in which pus from a dacryocystitis extended backward. The prognosis as regards sight is doubtful.

BUSINELLI (382) records another case in which a phlegmon of the sac opened into the orbit. Recovery took place after operation, but the optic nerve became atrophic.

KRAHNSTÖVER.

PARISOTTI (383) adds another to the two reported cases of polyp in the canaliculi. A second operation was required before the lobulated polyp and its pedicle were removed completely.

KRAHNSTÖVER.

In a woman aged sixty with a lachrymal fistula MITVALSKY (384) found a hard swelling of the lachrymal sac which gave him the impression of being a tuberculous periostitis. On incising it there appeared a green mass composed of the fungus which here and there had undergone a degeneration owing to the secondary immigration of staphylococci. The chronic inflammation of the lachrymal sac makes possible the actinomyces infection, the author believing that the normal sac does not offer favorable conditions for its growth.

V. MITTELSTÄDT.

X.—ORBIT AND NEIGHBORING CAVITIES.

385. BLOCH. The value of local anæsthesia; fistula above the eye of three years' duration healed after removal of a splinter of wood from the orbit. *Die Heilkunde*, 1898, No. 12.

386. HOFFMANN. A case of empyema of the sphenoidal sinus with involvement of the orbit. *Verhandl. d. Deutschen Otolog. Gesellsch.*, 1897, Jena.

387. FRANKE. On traumatic enophthalmus. *Zehender's klin. Monatsbl.*, xxxvi., p. 225.

388. WERNER. On pulsating exophthalmus. *Inaug. Dissert.*, Tübingen, 1898.

389. LESSHAFT. Periodic exophthalmus of the right eye due to movements of the head. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 264.

390. SSOKALOW. Temporary resection of the outer orbital wall in removing retrobulbar tumors. *Wratsch*, 1898, No. 33.

391. WINTERSTEINER. Lymphangioma cavernosum orbitæ. *Graefe's Archiv*, xlv., p. 613.

392. BIETTI. A contribution to the study of the osteomas of the orbit. *Annali di ottalm.*, i.-ii., 1898.

393. SCHIRMER. A case of cholesteatoma of the orbit. *Beiträge z. Augenheilk.*, xxxiv.

394. USHER. A case of cavernous angioma of orbit. *Brit. Med. Jour.*, Sept., 1898, p. 621.

395. MILLER, V. Exophthalmic goitre with unilateral eye symptoms. *Ibid.*, p. 629.

396. HINSHELWOOD. A case of exophthalmic goitre with unilateral eye symptoms. *Ibid.*, June, 1898, p. 1653.

397. WEBSTER. Sarcoma of the orbit. *Med. News*, Aug. 27, 1898.

BLOCH (385) reports that under anæsthesia produced by Schleich's infiltration method he penetrated 4 *cm* into the orbit and removed a bit of wood which had been carried in by an explosion three years before and had produced a fistula.

HERRNHEISER.

HOFFMANN (386) reports the case of a woman of twenty-nine who suffered from empyema of the sphenoidal sinus and, besides the characteristic symptoms of this disease, with a whole series of ocular disturbances. In the beginning there were ptosis, myosis, pain in moving the eyes, $V = \frac{4}{10}$, and later diplopia. After several slight operative procedures, the empyema was radically operated upon. The pus not escaping freely from the sphenoid, a well-marked neuritis developed, with further failure of vision, supraorbital pain, and muscular paralysis. The ocular symptoms subsided only after the conditions for the outflow of pus were improved.

FRANKE (387) reported three cases of enophthalmus, and believed that in two the cause was fracture of the orbital wall. A portion of the orbital fatty tissue protrudes and draws the eyeball backward. In the third case there was probably paralysis of Müller's orbital muscle or an injury of the sympathetic twig supplying it.

WERNER (388) adds another case of pulsating exophthalmus to the 168 recorded cases, which is of interest because carefully watched in its entire course. There was a fracture at the base of the skull passing through the optic canal, which at first only caused an interruption of the retinal circulation as if there had been an embolism. Later there occurred, probably from a spicula of bone detached from the anterior clinoid process, an injury of the carotid in the cavernous sinus causing pulsating exophthalmus and paralysis of the external rectus. Digital compression of the carotid was fruitless, and the artery was ligated. Four months later the effect was good and seemed to be permanent.

In LESSHAFT'S (389) case, when the patient held his head straight the right eyeball appeared slightly retracted. When he bent forward the ball protruded 15 *mm* and vision became poor. Sixteen similar cases are on record. The cause is probably a varicose dilatation of the orbital veins.

SSOKALOW (390) removed a cavernous angioma as large as a

hen's egg from the orbit with preservation of the ball, making Krönlein's temporary resection of the outer wall of the orbit. The four perforations for the sutures were bored before the bony flap was chiselled off. The result was satisfactory and the vision returned in part.

HIRSCHMANN.

WINTERSTEINER (391) extirpated from the orbit of a boy aged twelve years, a lymphangioma cavernosum. The diagnosis rested on the abundant lymphoid tissue and typical lymph follicles in the various parts of the tumor, together with the presence of blood and lymph in the cavities, and the continuation of the cavernous spaces with the perivascular lymph spaces which traverse the sclera along the posterior ciliary arteries. Three similar cases are reported in the literature.

BIETTI (392) reports a case of osteoma of the roof of the orbit in a young girl. It had apparently developed from the periosteum. The author discusses these bony tumors in general, and gives a microscopic description of his own specimen.

KRAHNSTÖVER.

SCHIRMER (393) reports a case of tumor of the orbit which was diagnosed dermoid, but at the operation proved to be cholesteatoma. There was evacuated an incredible amount of a moist, fatty, whitish mass, of pulpy consistency, which was composed of laminæ of cells interspersed with cholestrin crystals. The operation was not followed by complete recovery, and the fistulous opening that remained continued to discharge the whitish masses.

In USHER'S (394) patient, a man aged forty, the growth was situated within the muscular cone, was elastic, dark blue, and nodular. The symptoms were: V = p. l.; disc pale. Proptosis. No pulsation, bruit, or tenderness. Frontal headache. Duration probably five or six years.

WERNER.

MILLER'S (395) patient, a young woman, unmarried, presented right exophthalmos with Stellwag's and Graefe's signs; right lobe of thyroid enlarged, distinct tachycardia, and nervous excitability.

WERNER.

HINSHELWOOD'S (396) patient, a woman aged twenty-four, had slight exophthalmos of the left eye, with marked retraction of the upper lid and Graefe's symptom. There was uniform enlargement of the thyroid but no palpitation. The staring appearance was observed about five or six weeks before treatment, which consisted in administration of antipyrin. In three months from the onset, patient was well, except that Graefe's sign could still be

obtained. The persistence of the latter led the author to think that the cause of this phenomenon must be different from that of the retraction of the lid.

WERNER.

WEBSTER'S (397) case was a man of thirty-one years, who had slowly growing exophthalmos of the right eye. It proved to be due to an orbital growth which seemed to be periorbital in its extent, and was removed, leaving the eye in the orbit, as it seemed healthy and had good vision. Panophthalmitis, however, set in soon after, and the eye went on to atrophy. There was no return of the growth which was adjudged a sarcoma, in the orbit, but it was learned that he died nine months after of cancer of the throat.

BURNETT.

XI.—CONJUNCTIVA.

398. DAXENBERGER. Symblepharon operation by electrolysis. *Wochenschr. f. Therapie u. Hygiene d. Auges*, 1898, No. 40.

399. FURTHMANN. On symblepharon operations. *Inaug. Dissert.*, Kiel, 1898.

400. COHN, H. On the frequent and benign swelling of the conjunctival follicles in school children. *Berl. klin. Wochenschr.*, 1895, No. 25.

401. COHN, H. Historical notice on the differential diagnosis of trachoma and folliculosis. *Wochenschr. f. Ther. u. Hyg. d. Auges*, 1898, No. 44.

402. HELLGREN. On the mechanical and therapeutic treatment of trachoma. *Mitth. a. d. Augenklinik d. Karol. Med. Chir. Institutes zu Stockholm*, Jena, 1898.

403. HOOR. A remark on Prof. Leber's paper on Kalt's irrigations. *Zehender's klin. Monatsbl.*, xxxvi., p. 261.

404. MORAX and PETIT. Clinical and bacteriological considerations on the acute inflammations of the conjunctiva. *Ann. d'ocul.*, cxx., p. 161.

405. WINTERSTEINER. On cysts and concretions in the palpebral and retrotarsal conjunctiva. *Graefe's Archiv*, xlv., 2, p. 329.

406. WESTHOFF. Pigmentation of the conjunctiva. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 248.

407. STEPHENSON. The diagnosis of diphtheria of the conjunctiva. *Brit. Med. Journ.*, June, 1898, p. 1578.

408. GIFFORD. Five cases of Parinaud's conjunctivitis. *Amer. Jour. of Ophth.*, July, 1898.

409. WOOD, C. A. Removal of the tarsus and retrotarsal folds in certain cases of chronic trachoma. *Annals of Ophth.*, July, 1898.

410. MORTON, H. McI. Restoration of the fornix conjunctivæ for retention of prothesis. *Ophth. Record*, Aug., 1898.

DAXENBERGER (398) reports a case of symblepharon of the upper and lower lids in which he was able in repeated sittings to destroy the adhesions permanently by electrolysis.

FURTHMANN (399) reports two operations done by Völkers for adhesions between lid and eyeball. In both a flap of skin from the patient's lower lip was transplanted to the exposed portion of the ball, with good result.

HELLGREN (402) speaks of the various mechanical and operative measures employed in trachoma, and reports forty-two cases in which expression was employed. In follicular conjunctivitis and granular trachoma the results were excellent, and even in partly cicatricial cases improvement was obtained. In a few cases a second operation was required and in some an inflammation of the cornea followed the expression. DALÉN.

HOOR (403) does not believe in Kalt's irrigations. In the first place we should avoid bringing any instrument inside the lids, and in the second place the cornea should not be flooded for a long time, even with weakly antiseptic liquids. Both should be avoided for the purpose of protecting the corneal epithelium. He prefers washing out the eyes every half hour.

MORAX and PETIT (404) state that the Weeks bacillus, the diplo-bacillus, and the gonococcus when inoculated on the conjunctiva always bring about an inflammation and then disappear when this passes off. The ordinary habitants of certain mucous membranes, such as the pneumococcus and some varieties of the streptococcus, only produce inflammation under certain ill-understood conditions. A third class of micro-organisms are able to produce inflammation only when the mucosa is prepared by a previous infection. In this class are the diphtheria bacillus, the staphylococcus, and the ordinary streptococci. Gifford's experiments show, however, that experimental pneumococcus infection of the conjunctiva is possible. The Weeks bacillus not only causes conjunctivitis but also superficial ulcers of the cornea.

SULZER.

WINTERSTEINER (405) describes 1. Atypical retrotarsal glands, and the formation of serous cysts in the retrobulbar and tarsal conjunctiva. The cysts found here arise mostly from a proliferation of the superficial epithelium. 2. Cysts with concrement formation in Krause's glands. 3. Concrement formation in Henle's glands.

STEPHENSON (407) records two cases of diphtheritic conjunctivitis in which the diagnosis was confirmed by the demonstration of the Klebs-Loeffler bacillus. He points out that presumptive evidence can be derived from the history, the co-existence of diphtheria of other parts, loss of knee jerks, albumen in the urine. A membrane may exist with conjunctival inflammations caused by pneumococci, Weeks bacillus, pus cocci, chemical injuries, while it may occasionally be absent where the Klebs-Loeffler bacillus is present. This bacillus resembles the xerosis bacilli but differs in the following points: 1. The diphtheria organism loses its gentian violet, when in alcohol, much more quickly than the xerosis bacillus. 2. The diphtheritic bacillus gives rise to an acid reaction in neutral bouillon. 3. The xerosis bacilli only cause a local swelling when inoculated in guinea-pigs.

WERNER.

GIFFORD (408) here reports five cases of a particular form of conjunctivitis first described in France by Parinaud and Despagne, characterized by knobby swellings on the conjunctiva, which finally suppurate. The whole aspect of the disease points to an infection, and the French authors consider it of animal origin, as some of the patients had to do, in some way, with dead animal matter. None of Gifford's cases was so occupied, and he thinks this theory not proven.

Though he has made a number of investigations, up to this time he has not been able to settle upon any particular cause. The cases usually get well in from two to six weeks. The treatment that has been found most satisfactory is by nitrate of silver, copper, and, when the granulations are large, clipping them off.

BURNETT.

WOOD (409) has operated upon fourteen cases of chronic trachoma by removing the tarsus and retrotarsal folds after the manner described by Kuhnt at the Moscow Internat. Med. Congress. He is so much pleased with the results that he does not hesitate to recommend the operation to his confrères, particularly in those old cases where the tarsus is involved and where the

trachoma follicles are implanted in the connective tissue of the retrotarsal folds.

BURNETT.

MORTON'S (410) procedure is to incise the conjunctiva from canthus to canthus, inside of and parallel to the lid margin, deeply. Into the gap thus made he inserts a Thiersch graft of skin, and unites it only on the outer side to the conjunctiva. On this graft he at once implants as large an artificial eye as can be inserted. This holds the graft firmly in place and facilitates union.

BURNETT.

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

411. WAGENMANN. On a case of keratoconus with pulsatory variation in the size of the diffusion circles due to pulsation of the cornea. *Graefe's Archiv*, xlvii., 2, p. 426.

412. TENDERING. On corneal sclerosis. *Inaug. Dissert.*, Erlangen, 1898.

413. PETERS. On gummous affections of the cornea. *Düsseldorf*, 70. *Naturforscherversammlung*, 1898.

414. BARENDRECHT. On the pathological formation of vesicles in the cornea. *Inaug. Dissert.*, Amsterdam, 1898.

415. VAN MILLINGEN. Congenital absence of the first and second branches of the fifth nerves; bilateral neuro-paralytic keratitis. *Ann. d'ocul.*, cxx., p. 202.

416. PELTESOHN. Hereditary syphilis and keratoma lacia. *Deutsche med. Wochenschr.*, No. 18.

417. SCHMIDT-RIMPLER. On ulcer rodens. *Report of the Heidelberg Ophth. Soc.*, 1898; cf. *Arch. f. Augenheilk.*, xxxviii., 1, p. 124.

418. MATSCHULSKY. A case of gumma of the sclera. *Wojenno Med. Jour.*, Aug., 1898.

419. CLAVELIER. Recovery of an episcleritis developing with herpes zoster, after treatment by electrolysis. *Ophth. Klinik*, 1898, 15, p. 274.

420. GRADLE. The detection of unsuspected corneal changes by examination with strong lenses and focal illumination. *Ophth. Record*, Sept., 1898.

WAGENMANN'S (411) patient had an excessive keratoconus in one eye and objects observed with this eye alternately became larger and smaller. Examination with the Placido disc showed

an alteration in the size of the image reflected from the centre of the cornea synchronous with the radial pulse. The bulging of the cornea, producing myopia and consequently micropsia, was due to the pulsation of the vessels of the retina and uveal tract transmitted through the vitreous, lens, and aqueous to the cornea.

TENDERING (412) reports a carefully examined case of so-called corneal sclerosis observed by Eversbusch, which in the beginning was considered to be an atypical interstitial keratitis, and whose true nature was only discovered after long observation. The cornea became cloudy and dense without any signs of clearing, and, in the middle, underwent a fatty degeneration. Signs of conjunctival irritation were wanting. It would seem to have been a purely regressive metamorphosis caused possibly by an endarteritis obliterans of the vessels.

PETERS (413), excluding typical parenchymatous keratitis, describes those forms of corneal inflammation which are the direct manifestations of syphilis. He reports a case in which gummous products in the cornea break down rapidly under the use of mercury, and also two cases in which the cornea exhibited small isolated gummous tumors.

According to BARENDRECHT (414), in cases of infection of the eye from pathogenic bacteria, new vessels form in the cornea, springing from the marginal vessels, and lying chiefly in the anterior third of the cornea. These vessels form a network ending in a ring about the centre of the cornea. In the cornea many cloudy spots appear, due to the swelling and separation of the corneal lamellæ from inhibition. Leucocytes are present only in small number. The cornea, later, becomes clear, although the vascular network long remains. These corneal changes are due to the action of the products of metabolism arising from the micro-organisms in the vitreous. The injection of dead spores does not give rise to the formation of vessels, but the injection of irritating substances does.

WESTHOFF.

In a Turkish girl of six, whose parents noticed soon after birth that the eyes were insensible, VAN MILLINGEN (415) found deep corneal ulcers and pyramidal cataract in each eye. There was no protophobia, no lachrymation, and he found absolute anæsthesia of the cornea and conjunctiva, forehead, cheek, upper lip, and nose. Suturing the lids quickly cured the ulceration, and an iridectomy was done painlessly. The absence of any general or local disease

led Van Millingen to the conclusion that there had been a congenital defect in the fifth pair. SULZER.

PELTESOHN (416) speaks of the etiology of keratomalacia, emphasizing its frequent connection with hereditary syphilis, and in view of the unfavorable prognosis he recommends the use of mercury in every case.

GRADLE (420) examined the cornea under oblique illumination accurately focussed on the corneal tissue with a Coddington lens of $\frac{1}{2}$ or $\frac{3}{4}$ inch focus. In this way he has been able to detect diffuse corneal opacities after cataract operations; also a diffuse cloudiness of the corneal tissue in some cases of persistent asthenopia where the optic correction did not bring vision quite up to the normal; also, in some cases, circumscribed infiltrations which were not visible otherwise. BURNETT.

Sections XIII.-XVIII. Reviewed by DR. O. BRECHT.

XIII.—LENS.

421. RITTER. A case of luxation of the lens. *Arch. f. Augenhk.*, xxxvii., p. 348.

422. WIDMARK. The operative treatment of unripe and of partial stationary cataract. *Mitth. a. d. Augenklinik d. Karol. Med. Chir. Instituts zu Stockholm*, Jena, 1898.

423. CARRA. On the treatment of infection following cataract operations. *Bull. d. R. Acad. Med. di Roma*, xxiv., 4.

424. GUTTMANN. Double refraction in one eye due to nuclear sclerosis. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 193.

425. GUNN, DONALD. Notes on some forms of congenital cataract. *Ophth. Review*, xviii., p. 129.

426. JACKSON. Influence of age in causing opacity of the crystalline lens and the proper use of the word "cataract." *Four. Amer. Med. Assoc.*, Sept. 24, 1898.

RITTER (421), in a lens luxated first in the posterior chamber and then in the anterior and finally extracted, found degeneration and separation of the superficial layers of fibres, partial destruction of the epithelium, and complete disappearance of the nuclear zone.

WIDMARK (422) discusses the three operations mostly employed in cases of immature cataract for bringing about maturity, viz., dissection, iridectomy, and trituration of the cortex. In 1889-90 he tried the method suggested by McKeown and Wicherkiewicz,

that of extracting the immature cataract and washing out the remaining cortical masses by syringing the anterior chamber. The results were not good. Since 1892 he has followed the recommendations of Schweigger: (1) discission in patients under 20; (2) discission for the purpose of ripening between 20 and 40; massage of the cortex between 40 and 60; extraction without any preliminary operation, after the age of 60. Many practical points of importance are discussed in the paper. DALÉN.

After speaking of the various methods of combating infection, CARRA (423) reports three cases in which thorough syringing of the anterior chamber, mechanical removal of exudations, and cauterization of the infiltrated margins of the wound checked an advanced purulent infection and led to the saving of a certain amount of vision. KRAHNSTÖVER.

GUTTMANN (424) describes the case of a woman aged fifty-four who, in 1890, had hyperopia of 1 D in each eye, and perfect sight. For three years the sight has been growing worse. In 1898 L. with + 2, $V = \frac{5}{8}$; R. with — 5, $V = \frac{7}{30}$. Sn. II. from 20 — 10 cm. In mydriasis there was found, besides delicate equatorial opacities, a central gray veil-like opacity which proved to be due to nuclear sclerosis. Through the clear periphery of the lens the fundus was seen with + 2 D. In the middle of the lens the refraction was 7 D higher.

GUNN'S (425) paper contains records of cases of congenital cataract, chiefly shrunk or apparently so. In several there was a syphilitic history, and a low mental condition associated with fits. The results of operation were often unsatisfactory not merely as regards vision, but also with reference to the reaction. WERNER.

JACKSON (426) has found from 45 % to 77 % of lens opacities in patients above sixty-five years of age. All these he does not think should be called "cataract," for they very often remain stationary. Eye strain from want of proper glasses and certain acute diseases, and influenza, are developing causes of lenticular opacities. He thinks that most of these patients should not be told that they have "cataract." Albuminuria he has not found to be a cause of lens disease. BURNETT.

XIV.—IRIS.

427. WESTHOFF. Suppurative iritis after the use of iodide of potassium. *Medical Weekblad*, 1898, No. 16.

428. CARRA. Two cases of congenital aniridia. *Bull. d. R. Accad. Med. di Roma*, xxiv., 2.

429. SORGER. A case of spontaneous hemorrhage from the iris and ciliary body into the anterior chamber in a patient with leukæmia. *Münch. med. Wochenschr.*, 1898, No. 35, p. 1120.

In a patient with toxic amblyopia for whom WESTHOFF (427) prescribed iodide of potassium, a purulent inflammation of the iris and ciliary body broke out at two different times, but passed off at once after stopping the use of the drug.

CARRA (428) reports two cases of aniridia. In both cases the defect was bilateral, in both the iris was indicated by a narrow margin only, and in both there were opacities of the lens, there being anterior capsular cataract in two and nuclear cataract in one eye. Aniridia is mostly associated with other malformations, is almost always bilateral, and is rarely total, a narrow margin of iris usually remaining. Frequently there are opacities or anomalies of curvature in the cornea. The lens is usually cloudy and frequently luxated. The vitreous is usually normal; the choroid never colobomatous. Partial aniridia is rarer than total. Glaucoma has sometimes been observed as a complication. Pathological examinations have been made by Pagenstecher, Lembeck, Rindfleisch, and Treacher Collins. The refraction is usually myopic and the accommodation weak. There is often nystagmus, mostly horizontal. An hereditary disposition is frequently present. Manz's theory, that the development of the iris is hindered by the late separation of the lens from the anterior wall of the secondary optic vesicle, is accepted by the author as being satisfactory.

KRAHNSTÖVER.

SORGER (429) observed in a case of fatal leukæmia, hemorrhage into the anterior chamber in one eye after the other. The blood was evacuated by paracentesis. This therapy is original but hardly commendable, since hyphæmia is usually spontaneously absorbed, and it is not customary to bleed leukæmic patients.

XVI.—VITREOUS.

430. MANZUKO. On spontaneous hemorrhage into the vitreous. *Beitr. z. Augenheilk.*, xxxiv., 1898.

431. BRYANT. Experiments in the use of aluminum for artificial vitreous. *Four. Am. Med. Assoc.*, Sept. 24, 1898.

MANZUKO (430) reports some cases of spontaneous hemorrhage

into the vitreous, and speaks of the etiology and the source of these hemorrhages.

BRYANT (431) has used a globe of aluminum in the place of Mules's glass ball in evisceration and also implanted after enucleation with much satisfaction. The improvement he suggests is to have a frame of aluminum instead of a solid sphere. This allows the new tissue to grow in and around the artificial ball and make it more secure. His experiments on dogs seem to have demonstrated the position taken.

BURNETT.

XVII.—GLAUCOMA.

432. CARRA. On juvenile glaucoma. *Annali di ottalm.*, v., 1898.

433. JANNESCO. The treatment of glaucoma by resection of the cervical sympathetic. *Rec. d'opht.*, 1898, p. 449.

434. PANAS. A report on Jannesco's (preceding) article. *Arch. d'opht.*, xviii., 7, p. 448.

435. PANAS. Total keratectomy followed by suture. Applications of the method. *Arch. d'opht.*, xviii., No. 9, p. 545.

436. BERNHEIMER. Some remarks on my article and Hirsch's article on glaucoma in aphakic eyes. *Wien. klin. Wochenschr.*, 1898, 29, p. 703 (Polemical).

437. CHEATHAM. Glaucoma with detachment of the retina. *Annals of Ophth.*, July, 1898.

CARRA (432) states that glaucoma is much less frequent in youth than in old age. In the Jewish race not only is glaucoma more prevalent, but it also appears at an earlier age than in other races. The most frequent varieties of the disease seen in early life are the prodromal and the chronic form. The prognosis, especially as respects the results of operation in chronic glaucoma, is better in the young. It is remarkable (but not generally correct—H. K.) that Krannhals's statistics show that in patients under thirty years of age the glaucoma was in every case unilateral.

KRAHNSTÖVER.

JANNESCO (433) reports seven cases of glaucoma, among them two of glaucoma simplex, all treated by resection of the upper cervical ganglion of the sympathetic. He finds that this operation brings about an immediate and permanent decrease in intraocular pressure; the pupils become small, the pain ceases, and the vision improves markedly.

SULZER.

PANAS (434), referring to Jannesco's paper, states that one must distinguish between the immediate and the late effects of the operation, since the intraocular tension, diminished at first, may increase later and vision fail; as he showed in one case, the tension, which was normal before operation, became increased some time after operation. It is, furthermore, impossible to understand how this operation can be of benefit when the chamber angle is obstructed. Panas believes the number of observations too small and the elapsed time too short to warrant the conclusion that the operation is advisable.

V. MITTELSTÄDT.

PANAS (435) recommends the procedure which he had done two hundred times with good results in cases of cicatricial staphyloma and absolute glaucoma in which usually enucleation is done. In narcosis a curved Reverdin needle is entered at the limbus, carried behind the lens, and brought out at the opposite margin of the cornea. The needle is now threaded and later makes the middle suture. The cornea is now excised and the lens removed with a spoon, after which the needle is withdrawn and the suture tied. A suture is now passed on each side of the first, the lateral edges of the wound are trimmed off, and a round stump is obtained by a bloodless operation. The sutures are removed in a week, and a bandage is kept on a week longer. In case of hemorrhage in glaucomatous eyes evisceration is done.

V. MITTELSTÄDT.

CHEATHAM (437) reports two cases in which glaucoma and detachment of the retina were associated. In one the patient was a boy of sixteen years, and the glaucoma preceded the detachment.

BURNETT.

XVIII.—SYMPATHETIC OPHTHALMIA.

438. GUMPPER. On the curability of sympathetic irido-cyclitis. *Inaug. Dissert.*, Strassburg, 1898.

439. COPPEZ. Note on a case of sympathetic chorio-retinitis. *Rev. génér. d'opht.*, xvii., p. 298.

440. VACHER. On the relation between incarceration of the iris and sympathetic ophthalmia. *Clin. Ophth.*, 1898, xiv., p. 157.

441. MALL. On sympathetic ophthalmia (preliminary communication). *Centralbl. f. prakt. Augenheilk.*, xxii., p. 245.

442. SHAW, C. E. Sympathetic ophthalmia. *Brit. Med. Journ.*, June, 1898, p. 1580.

443. FERDINAND. Ophthalmitis occurring long after enucleation of the fellow eye for injury. *Ibid.*, p. 1583.

GUMPPER (438) collected sixty cured cases of sympathetic ophthalmia from the literature and adds six new cases, one of which evidently was not sympathetic ophthalmia. Treatment consists in enucleation and the use of mercurials. Resection the author considers of no value, since he has seen no case of true irido-cyclitis cured by neurotomy.

SHAW (442) first gives a very good review of the literature of sympathetic ophthalmia since Deutschmann's well-known experiments. The tendency is to throw considerable doubt on Deutschmann's theory of migration. Shaw examined eight injured eyes, four of which had given rise to sympathetic ophthalmia, without finding any micro-organisms. He also made experiments to determine whether, as Bach maintains, changes will occur in one eye from prolonged irritation of the other. Wounds were made in the ciliary region with septic instruments. Shot pellets were introduced, and jequirity at times used. His conclusion is that though a temporary irritation of one eye may cause a temporary exudation of fibrin and leucocytes both in the irritated eye and its fellow, long-continued irritation will not cause abundant exudation and consequent organic changes in the second eye.

WERNER.

FERDINAND (443) records two cases. In the first, some weeks after the injury, the eye was enucleated after some symptoms of mischief in the other; the latter partly recovered, but seventeen years later, having worn a glass eye for three years, irido-cyclitis began again. In the other case the injured eye was removed four days after the injury. Irido-cyclitis set in, in the other eye, twenty-two years later.

WERNER.

Sections XIX.—XXII. Reviewed by PROF. R. GREEFF.

XIX.—RETINA.

444. AXENFELD. On albuminuric retinitis in pregnancy. *Corrbl. d. Allg. Mecklenb. Aerztever.*, 1898, No. 199.

445. EWETZKY. On the pathology of albuminuric retinitis. *Wratsch*, 1898, Nos. 32, 33.

446. WILLIAMSON. Unilateral retinal changes in cerebral hemorrhage, embolism, and thrombosis. *Brit. Med. Journ.*, June, 1898, p. 1515.

447. BUCHANAN. Retinal changes in the macular region in cases of injury. *Ophth. Review*, xvii., p. 105.

The prognostic significance of albuminuric retinitis is, as regards life, bad; but the albuminuric retinitis of pregnancy is of less grave significance on account of the transient character of the kidney affection. The visual disturbances are likely to improve, and, according to AXENFELD (444), an expectant plan of treatment may be pursued while $V = \frac{1}{8}$ or better.

EWETZKY (445) examined an eye removed from a patient with albuminuria under the wrong diagnosis of sarcoma of the choroid. In the other eye there was well marked albuminuric retinitis. In the eye that was enucleated there were increased tension and detachment of the retina, and behind the lens but beneath the retina a large black mass which was mistaken for a neoplasm. When examined it was found that there was almost total detachment of the choroid, behind which was a grayish coagulated mass.

The cause of the various changes was traced to inflammatory disturbances in the vessels of the choroid and retina, there being thickening and hyaline degeneration. These vascular changes, with the increased blood pressure from hypertrophy of the left ventricle, are the cause of the extravasations and exudations.

WILLIAMSON (446) records thirteen cases of cerebral vascular lesions, eleven of which were verified by post-mortem, in eight of which retinal hemorrhage or venous dilatation was present, only in the eye on the same side as the lesion.

WERNER.

BUCHANAN (447) found, in many injured eyes, that the macular region was raised like a ridge above the general level. The retina here was separated from the pigment layer, and formed primary and secondary folds which were often agglutinated by exudation. Sight may be lost from destruction of the bacillary layer. The pigment in the hexagonal layer is sometimes irregularly distributed.

WERNER.

XX.—OPTIC NERVE.

448. DELIUS. On a case of primary tumor of the optic nerve. *Inaug. Dissert.*, Tübingen, 1898.

449. HIGIER. A case of optic neuritis with blindness lasting four weeks, but ending in recovery. *Neurol. Centralbl.*, 1898, No. 9.

450. SIDLER-HUQUEMIN. Optic-nerve atrophy after the use

of pomegranate root, with remarks on the dangerousness of extract of male fern. *Corrbl. f. Schweizer Aerzte*, 1898, No. 17.

451. SILEX. On tabic optic-nerve atrophy with sciopicon demonstrations. *Berl. klin. Wochenschr.*, 1898, No. 39.

452. AXENFELD. Myxo-sarcoma of the optic nerve removed by Krönlein's operation. *Corrbl. d. allg. Mecklenburgischen Aerztevereins*, 1896, No. 195.

453. POSEY. Hereditary optic-nerve atrophy. A report of three cases representing members of three successive generations affected by the disease. *Annals of Ophth.*, July, 1898.

454. HALE, A. B. Tobacco intoxication locally and systemically considered; report of a case of tobacco amblyopia. *Med. News*, Sept. 3, 1898.

According to Braunschweig, up to 1893 there had been reported ninety-four cases of primary tumor of the optic nerve. DELIUS (448) reports a case in a boy of thirteen of healthy family. The tumor had involved the eyeball, and this also was removed. The tumor consisted of cells with large round nuclei and long processes. It filled the entire dural sheath, and had passed through the lamina cribrosa into the interior of the ball.

HIGIER's (449) patient complained of headache and a sensation of fluttering in the field of the right eye. In the course of the day both eyes became almost completely blind. The patient belonged to a neuropathic family, and smoked and drank moderately. The day before his blindness came on, he had received news of the death of a son. Among other remedies pilocarpine was given by injection, which led to speedy recovery. In the course of two weeks the periphery of the field was restored, while a large central scotoma remained. The case, therefore, was one of typical acute retrobulbar neuritis.

While the text-books on materia medica, toxicology, and internal medicine all speak of the danger of using male fern, still not sufficient warning is given of the intoxications which may follow the use of this anthelmintic and of pomegranate root. SIDLER-HUQUEMIN (450) discusses the various toxic effects of these drugs, which in large doses cause irritation of the central nervous system and gastro-intestinal tract, and finally paralysis and death. In seventy-eight recorded cases of poisoning, permanent blindness in one or both eyes was noted in thirty-three, and amblyopia in five more. With these visual disturbances the pupils are large and

unresponsive, and the ophthalmoscopic picture is that of simple atrophy of the optic nerve, with narrowing of the retinal vessels.

SILEX (451) discusses the differential diagnosis of tabic optic-nerve atrophy and tobacco amblyopia with central scotoma. Under Monk's direction he had experimented on animals in order to discover whether the ordinary weak currents of 2 MA. on the skull and 3-5 MA. on the spine would produce a perceptible effect on the optic nerves, brain, and cord, and found that the galvanization of these parts was possible.

In AXENFELD'S (452) case the exophthalmic eye was directed straight forward and movement was free. The sight was normal three days before the operation, but on the day of operation vision had sunk to 0.8. The osteoplastic operation of Krönlein was successfully performed, the eyeball being preserved. The anterior 3-4 mm of the optic nerve was uninvolved, but in the bony canal the nerve was of double its normal size. The preparation showed that the nerve in the middle of the orbit was thickened to three times its proper size, and that the medullated fibres were extensively degenerated. Three and a half months later there had been no return of the growth.

POSEY (453) was able to examine one eye at the beginning of the disease known as hereditary optic-nerve atrophy, in a patient whose other eye had already made some progress in the disease. He found it in a state of slight hyperæmia with blurred outlines to the disk. Central scotoma developed in both, and the final atrophic appearance supervened as usual in such cases. A maternal uncle and a maternal great-uncle were also affected with the same disease and were examined by Posey, finding the condition the same practically as in the first case. All three began to complain of loss of sight at about the same age, twenty-five years. Two were rather heavy smokers, the other was not. BURNETT.

HALE (454) reports that he has seen conjunctivitis in workers in tobacco, due to the irritating quality of the tobacco dust. He reports a case of amblyopia in an excessive smoker who never used alcohol in any form. It was typical in all its features and disappeared on the abandonment of tobacco and under the use of strychnia. BURNETT.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

455. SCHMIDT. On direct injury of the optic nerve from shot wounds of the orbit. *Inaug. Dissert.*, Tübingen, 1898.

456. KELLER. On pulsating exophthalmus. *Inaug. Dissert.*, Zurich, 1898.

457. STOEWER. The histology of the healing processes in wounds of the sclera. *Graefe's Archiv*, xlv., p. 65.

458. SCHANZ. Luxation of the eyeball from blowing the nose. *Beitr. z. Augenheilk.*, xxiv., p. 33.

459. STÖCKL. Foreign body in the eye. Localization by means of the Roentgen X-rays. *Wiener klin. Wochenschr.*, 1898, No. 7.

460. BERNHARD. A case of filaria loa. *Arch. d'opht.*, xviii., No. 9, p. 604.

461. GRAHAM. Traumatic lesion of the pons Varolii. *Brit. Med. Journ.*, June, 1898, p. 1584.

462. DE SCHWEINITZ. A piece of steel in the vitreous located by means of the Roentgen rays according to Sweet's method; removal of the foreign body with the electro-magnet. *Ophth. Record*, July, 1898.

463. STARR, E. G. Steel in the vitreous located with the X-rays and removed with a magnet, with a description of an arrangement for determining when the magnet has found the steel. *Ophth. Record*, July, 1898.

464. HOTZ. Extraction by electro-magnet of a small chip of steel through the original corneal wound. *Ophth. Record*, July, 1898.

SCHMIDT (455) gives a *résumé* of the literature since 1884 in regard to penetrating shot wounds of the eye, and adds histories of two further cases treated in the Greifswald clinic. In the first the vision was lost, in the second the final vision was $\frac{1}{2}$.

KELLER (456) reports two cases of traumatic pulsating exophthalmus and adds a bibliography for the years 1880-1898, thus bringing up to date the bibliography in the article in *Graefes-Saemisch*.

The 102 cases tabulated are arranged in two groups comprising the traumatic and the idiopathic, and those cases are indicated in which a tumor of the brain or orbit was discovered to be the cause.

A glass-blower, whose eyes had previously been healthy, came to SCHANZ (458) with the statement that, on blowing his nose an hour before, the right eye had been driven out of the orbit, and, a fellow workman having replaced it by force, it again protruded

on his way to the physician. The physician being incredulous, the patient blew his nose and forced the eye out a third time. The lids and surrounding tissues were distended with air. The accident did not happen again, but the vision was reduced to $\frac{1}{3}$ under the picture of a slight optic neuritis.

The explanation is offered that the patient, who frequently had colds, had gotten into the habit of using the same force in blowing his nose as in blowing glass. Thus the accessory cavities had been distended and the bony wall of the orbit affected, until finally a rupture occurred and the air was forced directly into the orbit.

STÖCKL (459) was able with the X-rays to localize a foreign body in the eye in two cases in which other methods had failed even to determine the presence of a foreign body. After a skiagraph had revealed the presence of a foreign body, little lead disks were fastened with plaster at the outer margin of each orbit, in the middle of the upper and lower orbital margins of the injured eye, and on the bridge of the nose. The head was so placed that the shadows of the two disks at the outer margin of the orbits covered each other. Then from the relative position of the shadow from the foreign body and those from the other disks an accurate localization was possible.

BERNHARD (460) reports the removal in Landolt's clinic of a male filaria loa from beneath the skin of the upper lid in a man who had lived two years in the Congo region. The worm moved about readily, now appearing beneath the conjunctiva and now beneath the skin. Besides as lightt witching it caused only a little inflammatory redness without any swelling. v. MITTELSTÄDT.

In GRAHAM'S (461) case the pons was injured by a splinter of wood which entered the mouth and perforated the junction of hard and soft palate. There was right hemiplegia and hemianopsia. The case is very carefully recorded and charts of the fields are given. WERNER.

In DE SCHWEINITZ'S (462) case the bit of steel was located by the X-rays by Dr. Sweet and in the region of the macula. A triangular flap was made in the sclera below the margin of the external rectus, and a Hirschberg magnet introduced and directed to the point where the foreign body had been located. The bit of steel was withdrawn at the first attempt. It was triangular in shape and 2 mm by 3 mm large. It weighed 9 milligrams. There was considerable reaction some days later, but under judicious

treatment the eye ultimately recovered with a chalky-looking lens, but good light perception and good projection. BURNETT.

STARR (463) was able by means of the fluoroscope to see the bit of steel moving in the vitreous with each movement of the eyeball. The vitreous was filled with blood. An opening was made in the sclera at the most dependent part and a powerful electro-magnet introduced. A telephone was connected with the magnet, and when the contact of the steel with the magnet occurred it was plainly heard. The bit of steel was removed. No further history of the case is given. BURNETT.

In the case reported by HOTZ (464) the bit of steel had penetrated the cornea, the upper portion of the iris, and lens. It was not visible on account of the lens opacity. He enlarged the corneal wound and introduced the point of an electro-magnet into the lens substance. On the second attempt the chip was removed. It was triangular in shape, 1.5 mm at its base. The case did well. BURNETT.

XXII.—OCULAR DISTURBANCES IN GENERAL AFFECTIONS.

465. FÉVÉ and LAUBOV. A note on the variations in the mydriatic effect of atropine in epileptics. *Rec. d' opht.*, 1898, p. 385.

466. GABRIELIDÈS. Tabic hemianopsia. *Arch. d' opht.*, xviii., 5, p. 305.

467. TALKO. An unusual case of phthisis and anophthalmus of the right eye. *Wojenno. Med. Journ.*, May, 1898.

468. SULZER. Contributions to the study of herpes zoster. *Ann. d' ocul.*, cxix., p. 401, and cxx., p. 16.

469. LEITNER. Optic-nerve disease in chronic lead poisoning. *Ungar. med. Presse*, 1898, No. 26.

470. NOYON. On lead poisoning. *Nederl. Oogheekundige Bydragen*, Aufl. 6, 1898.

471. PERGENS. A contribution to our knowledge of cyanopia. *Ann. d' ocul.*, cxx., p. 114.

472. BOAS. The ocular symptoms of tabes and multiple sclerosis. *Samml. zwangloser Abhandlungen*, Vossius ed., vol. II., part 6.

473. DAWSON and RAMBAUT. Analysis of the ocular phenomena in forty cases of general paralysis of the insane. *Brit. Med. Jour.*, Sept., 1898, p. 687.

474. YARR. Malarial affections of the eye. *Ibid.*, p. 870.

In a tabic patient GABRIELIDÈS (466) found bitemporal hemian-

opsia, which later passed off in part, leaving the middle portion of the temporal field free, while there were still defects above and below.

V. MITTELSTÄDT.

TALKO's (467) patient was a soldier aged twenty-two, in whom, without demonstrable cause, the visual field of the right eye became contracted to the nasal side, the ball receded into the orbit, tension diminished, clonic spasms of the orbicularis appeared, and the mobility of the eye became impaired. Finally vision was lost entirely. The patient had attacks of fever, muscular twitching in the right side of the face, and a persistent turning of the head to the right. In spite of careful examination the cause of the symptoms was not discoverable.

HIRSCHMANN.

In a monograph on herpes zoster ophthalmicus, SULZER (468) comes to the conclusion that herpes eruptions may be divided into two great classes; it may be due to an acute specific immunizing disease, herpes fever, in which it corresponds to the exanthema of measles or scarlet fever; or it may be merely a symptom of various affections, such as syphilis, tabes, traumatic and infectious bone lesions, phlebitis, gout, sinus inflammation, tumors, vascular diseases, etc.

The greater number of cases seem to fall in the latter category. This is especially the case when the vesicular eruption of the skin and conjunctiva is complicated with symptoms on the part of the eyeball, such as interstitial keratitis, muscular paralyses, and optic neuritis. Such eruptions are not due to an acute infectious disease, but are rather symptomatic of an encephalic affection, circumscribed or diffuse, and mostly basal.

While the prognosis of herpes fever is good, it is uncertain in symptomatic cases, for in these there may come on severe symptoms on the part of the nervous system, or vision may suffer.

SULZER.

NOYON's (470) patient, a lead worker, forty-eight years of age, noticed that, in the course of a severe lead intoxication, the vision of the right eye had become poor. $V = \frac{1}{6}$, contraction of the field temporally and above, no central scotoma. In the vitreous were hemorrhages and dark fixed membranes. The disk was white and swollen, with blurred margins. The lumen of the vessels was very narrow and the walls were thickened. The retina was cloudy and exhibited hemorrhages along the vessels. The picture, therefore, was one of inflammation of the optic nerve passing over into atrophy. The left eye was not affected. WESTHOFF.

Blue-seeing has been reported eight times. PERGENS (471) now records a new case. The patient, a man of forty-four, after drinking heavily one evening awoke in the morning to find that everything appeared blue, and this condition lasted for three days. The eyes were normal in every respect. Red was seen as purple, white appeared to be of corn-flower blue, and blue appeared more saturated than normal. SULZER.

BOAS (472) gives a clear presentation of the ocular symptoms in *tabes dorsalis* and multiple sclerosis.

The authors (473) give an analysis of the ocular symptoms in forty representative cases of general paralysis in the Richmond Asylum, Dublin. Their conclusions are: that the sensory or sympathetic is the most commonly affected of the pupillary reflexes, then the light reflex, the consensual being rather oftener affected than the direct. Three cases showed advanced atrophy of the disks. There were two cases of neuritis, one only slight. Several cases of third-nerve paralysis were observed mostly in those having a syphilitic history.

[In estimating the pupillary reactions the acuteness of vision was not noted.—L. W.] WERNER.

YARR (474) states that malarial eye lesions all originate in circulatory troubles, and may be classified thus: 1, neuritis; 2, retinal hemorrhages; 3, retino-choroiditis; 4, effusion into the vitreous. In class 1 the chief symptoms are supraorbital pain and photophobia, often night-blindness. Rapid variation in V. Fields intact or slightly contracted. Color = V normal unless atrophy follows. The papilla has a "teinte rouge grisâtre." Partial atrophy occurs in 80 per cent. of these cases. 2. Hemorrhages may be minute peripheral, or large peripapillary and macular. They are often due to infarcts of parasites followed by extravasations. 3. This occurs generally towards the end of the hot stage, and is accompanied by supraorbital pain, photophobia, photopsia, and tenderness on pressing the eyelids. 4. These are rare and are described by Seely (*Trans. Amer. Oph. Soc.*, 1882). The author gives no cases. The following obscure affections have also been mentioned by writers on malaria: Sudden and persistent amaurosis without visible fundus change; periodic amaurosis; sudden amaurosis ending in atrophy; persistent central scotoma; periodical blue vision. Slight degrees of quinine amaurosis are very common in malarial cases under treatment. WERNER.

BOOK REVIEWS AND NOTICES.

(Continued from page 123.)

XVIII. **An American Text-Book for Diseases of the Eye, Ear, Nose, and Throat.** Edited by G. E. DE SCHWEINITZ and B. ALEX. RANDALL, of Philadelphia. Illustrated with 766 engravings, 59 of them in colors. 1251 octavo pages on glazed paper. Philadelphia, W. B. Saunders, 1899. Price \$7 net.

It would not have been necessary, on the part of the editors, to vindicate the propriety of comprising the diseases of the above four organs into one volume, for it is natural, and in America quite common, that one man extend his practice over the four departments, the eye and ear being the organs of the two higher senses, and the nose and larynx those of smell and speech, besides the beginning of the respiratory tract. They are anatomically connected and have physiologically many points of analogy. The physician who has trained himself in the diagnosis of the affections of one of these organs is prepared to master the methods of examination of the others. The four constitute a well rounded field of labor, which is not at all narrow, yet much more restricted than general surgery. How far a man will extend the sphere of his activity must be left to his choice. The more he limits himself to one organ, the less he will split his time and force, the deeper he can penetrate into his subject, the more skill he may acquire in the limited number of his operations, and the more he may advance the science and art of his specialty. On the other hand, he runs the risk of becoming narrow in knowledge and resources, and particularly of failing in the etiology, diagnosis, and prognosis of the diseases he has to treat. The specialist, as well as the general practitioner, must every day devote a part of his time and labor to preserve his general knowledge and follow the advance of science.

Another feature of the text-book under consideration the editors think it unnecessary to discuss is the "collaboration method," which certainly has its advantages, but no less its dangers. That in the volume before us the dangers have been more avoided than in any other collective literary enterprise we are familiar with, is the merit of the editors for which they deserve the greatest credit. The 618 pages of the ophthalmological part have been written by 30 authors, and yet we must confess there is a remarkable homogeneity and a fair observance of the *suum cuique* in the collective work.

As for the character of the work—we now deal only with the ophthalmological part—we take pleasure in declaring it of a high order throughout. It is not a book for the student or practitioner of general medicine, but for the advanced student and practitioner in ophthalmology, and we desire to make a distinction between ophthalmology and ophthalmic surgery, the latter being only a part of the former.

The **scientific part** of the text-book, the first 141 pages, is particularly to be commended. The embryology, anatomy, and histology of the eye, by GEO. A. PIERSON, of Philadelphia, comprises 61 profusely illustrated pages, and gives a very good, condensed description of the part, brought up to date.

In the general physiology of the eye Dr. A. P. BRUBAKER considers the eye as a living camera, in a conventional manner—14 pages. The chapter on general optical principles—katoptrics, dioptrics, physiological optics—by W. S. DENNETT and C. W. CUTLER of New York, 40 pages, is of fundamental importance and strictly scientific, requiring an extensive mathematical apparatus which, we are afraid, will shoot over 90 % of the living ophthalmic surgeons both in Europe and America. I don't want to say that it is beyond the horizon of a well-educated student, for it is only a fraction of Helmholtz's *Physiological Optics*. In the progress of radical teachings such studies will soon be more generally pursued and required than they are at present.

We have to content ourselves to mention the other chapters by title.

General examination of the patient, and functional testing, by G. E. De Schweinitz ; Ophthalmoscopy, B. A. Randall ; Refraction, E. Jackson ; Spectacles, R. J. Phillips ; Diseases of the Eyelids, B. L. Millikin ; Lachrymal Apparatus, Sam. Theobald ; Conjunctiva, J. E. Weeks ; Cornea and Sclera, S. M. Burnett ;

Ciliary Body and Sympathetic Ophthalmia, R. L. Randolph ; Injuries, A. A. Hubbell ; Glaucoma, J. A. Lippincott ; Lens, W. E. Hopkins ; Vitreous, Fl. Carrow ; Retina, L. Howe ; Optic Nerve, H. Gifford ; Defects of Vision, C. A. Wood ; Visual Field, H. V. Würdemann ; Intraocular Growths, W. A. Holden ; Motility, A. Duane ; Orbit, F. Buller.

The **Operations** are distributed as follows :

Preparations, etc., Anæsthesia, G. E. De Schweinitz ; Eyelids, F. C. Hotz ; Conjunctiva, Cornea, Sclera, Globe, C. W. Kollock ; Iris and Lens, H. Knapp ; Muscles, S. C. Ayres ; Lachrymal Apparatus, S. Theobald ; Orbit, F. Buller. In an appendix are treated of : Color Blindness in R. R. Employés, J. E. Jennings and A. G. Thompson ; Röntgen Rays, W. M. Sweet ; Practice of Operations on Animals' Eyes, C. A. Veasey ; Micro-organisms in Eye Diseases, G. E. De Schweinitz.

We have perused the book with great interest, and though here and there we differ with some of the authors, we can say that the presentation of all the subjects is good, none treated at undue length, some rather laconically, but nothing essential seems to have been omitted. The typography and proof-reading are very good. Our opinion is that every American eye surgeon will be gratified in adding this text-book to his library. H. K.

XIX. A Practical Handbook of the Muscular Anomalies of the Eye. By HOWARD F. HANSELL and WENDEL REBER. 182 small-octavo pages, 28 illustrations, and 1 plate. Philadelphia : P. Blackiston, Son, & Co., 1899. \$1.50.

This neatly gotten-up little book contains in very plain and easily intelligible style all that has thus far come to light on the disturbances of motility and their treatment. Abstruse deduction and specious argumentation are avoided. It is a complete and well-arranged guide-book for the study of a large group of eye-diseases which present themselves to the ophthalmic practitioner more and more every year, and to which particular attention has been paid in America. H. K.

XX. A Treatise on Unripe Cataract. By WM. A. M'KEOWN, of Belfast. Large-octavo volume of 202 pages, with 60 original drawings. H. K. Lewis, 136 Gower Street, London, 1898.

Dr. M'Keown's treatise is a most valuable contribution to the treatment of cataract and will be read and studied with interest and profit by every, even the most experienced, ophthalmic

surgeon. Its principal object is to describe, in minute detail and based on personal experience, how to remove unripe cataracts by a method "of very general application, involving no very great difficulty for the surgeon, and no special risk for the patient, with a precise statement of the rules for its application, and detailed reports of an adequate number of illustrative, non-selected cases." This is a great practical question the solution of which has been tried in many ways. M'Keown's method is to inject a liquid into the capsular sac "by a fine hollow needle immediately before the capsulotomy, after section at the corneo-scleral junction with iridectomy" (p. 54). "If the cortex is soft, the needle readily enters, without danger of dislocating the lens. It renders transparent substance opaque, breaks up striated, flaky, mother-of-pearl cortex, separates cortical substance from the lens, and may, if the surgeon uses the method freely, wash out more or less" (p. 55). The difficulties encountered in the introduction of the needle are considered by M'Keown to be of great diagnostic and prognostic value :

1. "In nuclear cataract, the needle, instead of entering the lens, may push it before it." The surgeon then must desist lest he rupture the zonule of Zinn. Such lenses are sclerosed and will come out *en masse*.

2. "When in nuclear cataract the needle enters readily, the cortex is relatively soft, and may remain after expulsion of the nucleus. Here, after injection, the superficial cortex becomes opaque, generally at once, but there should be no hurry in removing the lens."

3. In cortical cataract the injection makes the lens swell, . . . and "in case of a small nucleus the latter might sink down and lead artificially to the same condition and the same troubles as are met with in Morgagnian cataract" (p. 60) [which troubles the reviewer has never found great].

The author discusses the efficacy of massage, irrigation, and scooping, each of them used alone, or in combination with intracapsular injection or with either or both of the others.

Quite interesting is the tabular arrangement of the probable behavior of the various forms of cataract during the operation, and what can be expected from the different procedures when applied to these forms. The reviewer would agree with most, but not all, of the author's statements and propositions, but for lack of space he has to forego arguing his points.

The author devotes a good deal of space—in text-book manner and without imparting much novel or suggestive information—to the preparation for cataract operations in general, asepticism, instruments, light, and optical aids. Then follows (in chapter vi.) a detailed description of the apparatus, method, and liquid used for injection and irrigation. The liquid is a warm, physiological saline solution, sterilized, in a flat-bottomed Florence flask, arranged as a syphon by a glass tube dipping into the liquid inside and provided with a rubber tube outside to which is attached the hollow needle whose tip is introduced into the lens capsule. The liquid is forced out by air pressed into the flask by an elastic ball through a second, shorter glass tube, in the well-known manner. The description is illustrated by plates.

Now follows a description of the usual operation for cataract from which we learn that the author, after trials with simple extraction, that have proved unsatisfactory, has returned, as a rule, to the combined method. The accidents during the operation, the post-operative incidents, and the after-treatment conclude the general part of the book, 125 pages. The table of 155 case records, mentioned above, gives in the first 55 cases the ordinary forms of incomplete cortical cataract in patients up to sixty years of age, 34 of the same kind in patients above sixty, and 26 of uncommon forms of cortical cataract. Then follow 37 cases of incomplete nuclear, and 3 cases of complicated cataract.

Intracapsular injection was made in 55 cases; attempted but desisted from in 6. The great field for intracapsular injection is in cortical cataract.

Irrigation in various ways was performed in 146 cases, in 123 clearing the pupil perfectly, in 23 partially. Results good.

As post-operative incidents the author noted :

Case 57. Prolapse of iris in a case of simple extraction, treated with electro-cautery. S $\frac{1}{80}$.—Case 62. Irido-cyclitis, following incomplete removal of cortex because of high tension.—Case 71. Sepsis.—Case 110. Late irido-choroiditis; cause unknown.—Case 141. Nervous shock.

In conclusion the reviewer begs to say that intracapsular injection as presented by the author appears to have been followed by good results and have been free from notable danger. It introduces a new stage into the extraction of cataract that requires a relatively cumbersome apparatus and the excision of a piece of iris. Whether these disadvantages are outweighed by

its intrinsic value cannot be determined by the reviewer of the treatise, however favorably he may be impressed, but only by the personal experience of many competent surgeons. H. K.

XXI. *Recherches anatomiques et cliniques sur le glaucome et les neoplasmes intraoculaires.* By Prof. PANAS and Dr. ROCHON DU-VIGNEAUD. With 41 figures in the text. Paris : Masson & Co., 1898. 7 frs.

The article **Glaucoma** treats in twelve chapters, 240 pages, of this remarkable disease in all its aspects. The first six chapters contain the normal and pathological anatomy and the physiology of the parts concerned in glaucoma, illustrated by numerous and well-executed illustrations. Chapters viii. and ix. give a *résumé* of the authors' clinical observations and the pathological anatomy of the available cases ; chapter x., a critical discussion of the glaucoma theories.

The description of the tumors of the choroid (sarcomas) occupies 110, and that of the retinal tumors 65 pages. Remarks on pseudo-tumors (42 pages) conclude the nicely gotten-up volume. We cannot say that we find in the monograph a great deal that is new, but the literature on the subject, especially the German, is carefully cited and discussed. Any one who wants to inform himself on the different questions of glaucoma up to date could not find for his purpose a more interesting and more authoritative book.

H. K.

XXII. *Glaucoma ; its Symptoms, Varieties, Pathology, and Treatment.* By ALEX. W. STIRLING, M.D. St. Louis : Parker, 1898. \$1.50.

This monograph of 177 large-octavo pages, with some microphotographs, is a concise and clear exposition of the clinical and pathological features of glaucoma. It is based on lectures given by the author in the Post-Graduate School and Hospital, New York. They were published serially in the *ANNALS OF OPHTHALMOLOGY*, and many oculists will thank the publisher for putting the very valuable treatise in a convenient form at their disposal. H. K.

XXIII. *Communications from the Eye Clinique of the Carolinian Med.-Chir. Institute of Stockholm* (in German). By Prof. J. WIDMARK. First number, with a plate and 4 text figures. Jena : G. Fischer, 1898.

This publication—251 large-octavo pages, well printed on good paper—is the first number of a German edition of papers which have

appeared in the Swedish language, of which others will follow at irregular intervals. The present number contains seven articles :

1. On the position of the papillo-macular bundle.
2. Statistical investigations on myopia.
3. On the violet end of the spectrum.
4. Experimental investigations on the disinfection of the conjunctiva, by Albin Dalén.
5. On the mechanical and medicinal treatment of trachoma, by U. Hellgren.
6. The operative treatment of unripe and stationary partial cataracts, by J. Widmark.

All these papers are of great practical value, and readers of German will be very grateful to Professor Widmark for having put these contributions at their disposal.

H. K.

MISCELLANEOUS NOTES.

SOCIETY MEETINGS AND ELECTIONS

The **Western Ophthalmological and Oto-Laryngological Association** at its annual meeting, 10th and 11th February, 1899, at New Orleans, elected Dr. W. Scheppegegrell, of New Orleans, president, Drs. M. A. Goldstein, of St. Louis, and H. V. Würdemann, of Milwaukee, Vice-Presidents, and Dr. F. C. Ewing, of St. Louis, Secretary.

Société française d'ophtalmologie. The 17th annual meeting will be held at the Hôtel des sociétés savantes, opposite L'école de médecine, Paris, May 1st. Subject for general discussion will be: "La suppression du cristallin transparent," introduced by Professor Pflüger, of Bern.

APPOINTMENTS.

Privatdocent ÖLLER, of Munich, and Privatdocent BAAS, of Freiburg i. B., have been appointed Extraordinary Professors.

Dr. HERMAN SNELLEN, Jr., has been appointed Associate Professor of Ophthalmology at Utrecht, Holland.

Dr. C. A. WOOD has been appointed Professor of Ophthalmology at the College of Physicians in Chicago.

Dr. TSCHERNING has been made Chevalier de la Légion d'honneur.

Obituary.

Dr. JULIUS SAMELSOHN, of Cologne, died March 7, 1899, in his fifty-eighth year. He was a pupil of v. Graefe, eminently talented, very industrious, enterprising, and scientifically extraordinarily productive. He settled at Cologne in 1867; founded the Cologne Charitable Eye Hospital. Among his numerous publications we

mention particularly one which is of paramount importance and will secure for him a permanent place not only in the history of ophthalmology but also in that of general medicine, viz. : "On the Anatomy and Nosology of Retrobulbar Neuritis" (*Arch. f. Ophthalmol.*, xxxviii., 1, 1882). It describes the author's discovery of the atrophy of the papillo-macular bundle in toxic amblyopia and other diseases.

Dr. JUNGE, Professor of Ophthalmology in St. Petersburg, a pupil of v. Graefe and Helmholtz, died last year. He published valuable contributions to ophthalmological literature, and was for a time the most prominent ocular surgeon in St. Petersburg.

Dr. CLIFTON S. GRAY, a well-known and accomplished oculist and aurist, died February 14, 1899, at Little Rock, Ark. He was forty-nine years old, and a native of Missouri.

JOURNAL NEWS.

Dr. H. V. WÜRDEMANN, of Milwaukee, who has been associate editor of the *Annals of Ophthalmology*, in charge of the German literature, has accepted the position of editor-in-chief, instead of Dr. Casey A. Wood, of Chicago, resigned. Dr. Wood will retain an interest in the *Annals*, and will remain in charge of the Italian ophthalmological literature.

Since January of 1899 a new monthly German journal of ophthalmology, under the title of *Zeitschrift für Augenheilkunde*, has been published by S. Karger, in Berlin, at the annual price of Mk. 30. It is edited by Profs. H. KUHN, of Königsberg, and J. MICHEL, of Würzburg, assisted by a corps of well-known collaborators : Cirincione, V. Ewetzki, V. Grosz, Gruber, Kauwcki, Koster, Widmark, Bach, Czermak, Haab, Mellinger, Pagenstecher, Peters, Raehlmann, Schmidt-Rimpler, Silex, Uthoff, Vossius, and Wilbrand. The journal will publish original articles on all ophthalmological subjects, reports of societies, and half-yearly reports on the progress of ophthalmology in all countries. The ophthalmological literary production of Germany is so extensive and valuable that new and earnest enterprises are sure to be well supported, both by contributors and subscribers. We doubt, however, that the half-yearly reports are needed to fill a want, for Germany is well supplied with monthly, quarterly, and annual reports. Yet competition will here, as in most enterprises, serve a good purpose ; it will stimulate the older journals

to introduce, among other improvements, a prompter appearance of their reports.

A new ophthalmological journal in Spanish has appeared in monthly numbers of 24 or 32 pages in Mexico, at the annual price of \$2. It is edited by Drs. M. U. TRONCOSO and D. M. VÉLEZ, of Mexico, J. SANTOS FERNÁNDEZ, of Havana, and CHAS. A. OLIVER, of Philadelphia, under the title of *Annales de Ophthalmologia*. A long list of foreign collaborators will give their support to this periodical, which in its country is certainly opportune. Its chief contents consist in abstracts from literature.

Contents of the last numbers of the Archiv für Augenheilkunde (German Edition of these ARCHIVES).

Vol. XXXVIII., No. 2. Issued December, 1898.

9. L. LAQUEUR (Strassburg). Movements of the pupil.
10. PURTSCHER (Klagenfurt). Traumatic enophthalmus.
11. SEYDEL (Breslau). Aneurysma arterio-venosum retinæ.
12. C. PEIRONE (Turin). Expulsive hemorrhage in cataract extraction.

13. K. KIRIBUCHI (Tokio). The dilatator muscle of the pupil.

14. G. ABELSDORFF (Berlin). Translation of the original articles of the English Edition of these ARCHIVES (ARCH. OF OPHTH., vol. xxvi., No. 4; vol. xxvii., Nos. 1, 2, 3).

Systematic Report of the Progress of Ophthalmology in the 2d quarter of 1898 (translated).

No. 3. Issued February, 1899.

15. HABERKAMP (Bochum). Bilateral blindness from a shot with a Tesching rifle.

16. M. REIMAR (Hirschberg). Hemorrhagic retinitis from endarteritis proliferans.

17. H. LEWIN (Berlin). Abnormal tortuosity of retinal vessels.

18. G. LEVINSOHN (Berlin). Choroidal sclerosis with secondary degeneration of the retina.

19. G. ABELSDORFF (Berlin). The original articles in the ARCH. OF OPHTH., vol. xxvii., No. 4 (Kibbe, H. Knapp, Sweet, Lippincott).

Systematic Report, 3d quarter, 1898 (translated).

No. 4. Issued March, 1899.

20. L. HEINE (Marburg). Anatomy of the myopic eye.
21. M. REIMAR (Hirschberg). The so-called embolism of the central artery of the retina and its branches.
22. C. RITTER (Bremervörde). Embryology of the frog's lens.
23. K. JARNATOWSKI. Iridocyclitis from choroidal sarcoma.
24. G. ABELSDORFF. The original articles in ARCH. OF OPHTH., vol. xxvii., No. 5 (Zimmermann, Dunn, Holden).

Systematic Report, 4th quarter of 1898. Translation in our next issue (May number).

Erratum.—The price of *Ramsay's Atlas of External Diseases of the Eye*, in the book notices of the January number, page 120 of this volume, is erroneously put down as \$16, whereas it should be \$20.—ED.

ARCHIVES OF OPHTHALMOLOGY.

A CASE OF PARALYSIS OF DIVERGENCE: ITS BEARING UPON THE THEORY OF SQUINT AND HETEROPHORIA.

BY DR. ALEXANDER DUANE, NEW YORK.

(With a text figure.)

THE case here given is reported, not so much because it is rare, for similar cases have long been known, and the explanation of them here advocated has been given by Parinaud and Uhthoff (5). These cases, however, are highly interesting from the light they throw upon the pathogenesis of periodic squint; and the one here reported will be used mainly as a text to introduce certain considerations bearing upon the latter subject.

STRABISMUS CONVERGENS OF SIX YEARS' STANDING DUE TO PARALYSIS OF DIVERGENCE. ASSOCIATED LATERAL MOVEMENTS AND CONVERGENCE UNAFFECTED. BEGINNING TABES.

Mrs. J. H., aged thirty-five, married. Seen at my office, Nov. 19, 1898.

History.—Six years ago attack of neuralgia, associated with numbness and paresis of left arm and with sudden attacks of amblyopia. Then diplopia set in with a gradually increasing convergent squint. Ever since has suffered from various nervous troubles, especially neuralgic pains in the head (hemicrania) and spine (lightning pains).

In January, 1895, examined by Dr. Pischel, of San Francisco, who found an esophoria of 34° for distance, and of 20° for 40 centimetres. After operation, 14° for distance, 0° at 40 centimetres. Pupillary symptoms as now, but pupils slightly unequal. No other evidences of tabes at that time. Dr. Pischel did a tenotomy of the left internus, and later an advancement (capsu-

lar) of the left externus. This producing only an incomplete correction, he very properly proposed to do a similar operation upon the right eye, but this the patient refused.

Head symptoms somewhat relieved by operation, but other symptoms very troublesome. Some of these attributable to uterine and ovarian disease, from which she suffers.

Is using + 0.50 sph. for distance and near.

STATUS PRÆSENS.

Vision.— $\frac{1}{8}$ — each. R. accepts + 0.25 cyl. ax. vert. L. + 0.50 sph. wi. + 0.50. cyl. ax. vert. Under homatropine. R. $\frac{1}{8}$; wi. + 1.25 sph. $\frac{1}{8}$. L. $\frac{1}{8}$; wi. + 1.75 $\frac{1}{8}$. Accepts these glasses after effects of homatropine had worn off.

Field of vision.—Perfectly normal for even the minutest test-objects and all colors.

Exterior of eye.—Normal, except for old macula corneæ L. eye.

Pupils.—Of medium width, and equal. No reaction to light; slight, but distinct, reaction to convergence (Argyll-Robertson pupil).

Fundus.—Normal, except for a well-marked sector of temporal pallor in both discs.

Muscles.—At fifteen feet, esophoria of 25° and 26° by all tests (screen, parallax, Maddox rod, phorometer). L. hyperphoria, 2° . Strictly monocular vision for distance, R. eye alone being used for fixation. No spontaneous diplopia for distance under ordinary conditions, but gets homonymous diplopia with red glass, and also when deviation is partly corrected by a prism of 13° base out.

Esophoria diminishing to 15° when the gaze is directed moderately far to either the right or the left. This diminution in lateral rotation apparent at all distances. Esophoria and the diplopia also diminishing progressively as the test-object is approximated to the eyes until, at a distance from 6" to 8", there is single vision and orthophoria. Within this limit there is exophoria. Convergence near-point 2", or somewhat more from root of nose (*i. e.*, slightly subnormal convergence). For near points, binocular fixation and true binocular single vision.

Field of fixation, field of binocular single vision (at near), and excursion movements of eyes unrestricted in all directions. The outward movement, or abduction, greater than the inward move-

ment (adduction) in each eye, and excursions of L. eye less than R. in both directions (abduction, R. 65° , L. 50° ; adduction, R. 45° , L. 40°).

Extra-ocular signs.—Romberg symptom. Absence of knee-jerk. No ataxia.

Subsequent examinations (the last one made Jan. 26, 1899) confirmed the above findings in all respects.

The first fact of importance to be stated with regard to this case is that the conditions present *cannot be ascribed either to paralysis of the externi or to contracture of the interni*. For, if the former was the causal factor, the outward rotation of one or both eyes would have to be curtailed, and considerably too, to produce so marked a deviation. So, too, a contracture of the interni, such as would be competent to produce a squint of this extent, would necessarily be associated with curtailment of the excursion outward coupled with a very decided increase of the excursion inward. But in the case reported the outward excursion of each eye, so far from being restricted, is in excess of the normal; and the degree of actual inward rotation that either eye can perform is certainly not excessive, but rather subnormal.

Furthermore, the fact that the deviation diminishes when the gaze is directed laterally, is a proof that it cannot be due either to paralysis or contracture; for in both these conditions the deviation should increase notably as the eyes are carried toward the side of the paretic or the contracted muscle.

Again, if the squint was due to either of these factors, it ought to be almost, if not quite, as marked for near as far distance. But, as a matter of fact, the deviation diminishes *pari passu*, as the object looked at is approximated to the eyes, and at moderate distances is practically nil.

The same objections hold against the case being regarded as one of *muscular spasm*.

It is plain, therefore, that we must consider it simply as a variety of periodic squint. Looking at it in that light, let us see what is its probable explanation, *i. e.*, what place it occupies in our classification of strabismus.

VON GRAEFE'S MYOPATHIC THEORY OF PERIODIC SQUINT.

Von Graefe, in an early and very exhaustive essay on squint (1) attempted to explain cases of this sort, with all other cases of strabismus, as being purely myopathic. He regarded all cases of strabismus as being due to alterations in the mean length of the muscles. That is, a man has a convergent squint either because his externus is too long or his internus too short. This theory, which apparently fits cases of purely concomitant strabismus, he endeavors to accommodate also to cases of periodic (or, as he calls it, intercurrent) squint.

Von Graefe divides cases of periodic convergent squint into three classes:

A.—Cases in which there is no obvious deviation when the patient is not looking at anything in particular, but in which *deviation at once sets in when he fixes his gaze sharply upon an object*, whether near or distant.

In a certain proportion of these cases, von Graefe says, the deviation represents simply an attempt to exclude one of the double images, which cause no annoyance as long as they are indistinct, but which become disturbing to the patient when, by accurate fixation, he renders them well defined. But this explanation by no means holds good for all cases, since the deviation frequently persists when one eye is excluded by a screen so that there is no diplopia to cause disturbance. Nor can accommodative effort be held accountable for the squint, since the latter occurs at all distances, and also when glasses of varying strength and kind are placed before the eye.¹ Hence, von Graefe argues that the mere act of sharp fixation may, in virtue of the heightening of muscular tensions required in order to keep the eyes fixed, excite an abnormal stimulus to contraction, provided the tendency to such contraction is already resident

¹ I cannot regard these objections as altogether valid. The mere placing of a screen before one eye, while preventing diplopia, does not produce any essential change in other respects; and an eye which had been accustomed to squint, in order to exclude double images, whenever fixation was performed, would very likely still squint as a matter of habit, during fixation unaccompanied by diplopia. Indeed, von Graefe (*l. c.*, p. 284) admits this. And against the second objection, it may be said that an accommodative squint is not always affected at once by the use of glasses.

in the muscle. In other words, the internus has all along a tendency to morbid contraction, which tendency does not assert itself so long as all the muscles are relaxed, but at once becomes manifest when the muscles, owing to the requirements imposed by fixation, are thrown into a state of tension.

B.—Cases in which a pathological *convergence occurs only when accommodation is made for near points.*¹ This is very common—indeed, constitutes the ordinary variety of periodic convergent squint as we see it in hypermetropes, particularly in the young. In the great majority of cases, it is, as von Graefe says, the evidence of an excessive accommodative effort—an effort which, of course, increases as the object looked at is approximated to the eyes.

I cannot, however, admit that excessive accommodation is the only factor that can produce a convergence of this sort, since there are cases, not very frequent to be sure, in which the tendency to converge is not affected by persistent elimination of the accommodative element.

C.—Cases in which the adjustment of the visual axes is *proper up to a certain distance (8 inches, 1 foot, 4 feet), but beyond this distance there is marked convergence.*

This condition, von Graefe says, occurs in the following:

(a) Myopes, who for the space within which they can accommodate, adjust their visual axes properly, but beyond this point squint. The muscle energies, being morbidly altered, dispose the eye to deviation, and the eyes follow this natural tendency to deviate as soon as the images are no longer sharp.

(b) Unilateral myopia; or anisometropia of any kind.

(c) Unilateral opacities of the media or irregular astigmatism, rendering the image in one eye indistinct.

(d) Very small changes in the mean lengths of the ocular muscles, producing a degree of tension which can be overcome if a strong effort is made, but which otherwise causes deviation.

In cases *b*, *c*, and *d*, von Graefe argues that when the

¹ For the sake of clearness in discussion, I have reversed von Graefe's order of treating the subject, and have taken up his third class (Category B) before considering his second.

object of vision is sufficiently near the eye the retinal images are made so large as to force themselves upon the attention and demand fusion, and moreover the differences in size of the images and distinctness are then more readily ignored, so that under these conditions binocular fixation takes place; while with the object farther away from the eyes, the natural tendency of the latter to converge asserts itself, and the patient squints.

In other words, the patient tends to squint all the time, because the externus is too long, or the internus too short. Whenever the retinal images are so small or indistinct as not to afford sufficient stimulus for the patient to overcome this tendency, he lets his eyes go, and actually squints. But, whenever, by bringing the object close to his eyes, the retinal images become so distinct (Case *a*) or so large (Cases *b* and *c*) as to demand attention, or when the tendency to convergence is slight, so that if the images are large it is readily superable (Case *d*), the squint is overcome, and the patient has binocular fixation.

This Class C of von Graefe's comprises our case. None of his explanations, however, apply to it¹; nor yet is it explained by another hypothesis which von Graefe puts forth later (2) to account for certain cases of the sort occurring in myopés. In these there is neither considerable anisometropia, nor inequality of sight, but simple myopia of medium degree, with marked convergence and troublesome homonymous diplopia for distance, and with binocular single vision for near. In these cases, the deviation, which usually sets in suddenly at a variable distance beyond the patient's far point and *from there out remains about the same*, is due, according to von Graefe, to preponderance and contracture of the internus produced by excessive use of the eyes at near points, or by muscular weakening due to exhausting diseases.

¹ It might be argued that it comes under the cases marked *d* above, being due to moderate increase in length of the externus or decrease in length of the internus. But if this were the case, the outward excursion of the affected eye would be limited and the inward increased (reckoning from the primary position); and again, owing to the great tension set up in the shortened internus, when the eye is turned outward, the deviation ought to increase as the eye leaves the primary position. As a matter of fact, conditions the reverse of these obtain.

This latter group of cases is interesting and important because of the troublesome diplopia to which such deviations give rise, and which may call for an operation to relieve it.¹ They develop usually in adults, particularly in myopes who have not used glasses. According to von Graefe they constitute about two per cent. of all cases of squint; but this estimate seems rather high. To the explanation that he gives for these and similar cases, there are various objections that I shall now proceed to consider.

OBJECTIONS TO VON GRAEFE'S HYPOTHESIS.

It must be apparent how forced are the explanations that von Graefe was compelled to give in order to make his cases of squint fit the theory of a universal myopathic origin.

1. *His explanations are contradictory.* For, when considering the class of cases given here under A, he argues that if the muscular conditions are such as to favor a convergent strabismus, a squint will supervene whenever the images are distinct, and an effort is made to perform fixation; while, in attempting to explain the cases given under C, he holds that, although the same muscular conditions prevail as in Class A, it is precisely when the images are indistinct and when no very strenuous efforts at fixation are made, that a squint develops.

Again, as von Graefe himself admits, the fact that in cases of Class C the deviation when one eye is screened is the same as the deviation with both eyes open militates against his hypothesis. We may, however, agree with him that the connection between the movements of the eyes is such that even when the deviation is dependent solely upon imperfection of sight in one eye, exclusion of that eye from vision will not affect the deviation. But if we accept this argument, we find ourselves compelled to abandon the diametrically opposed statement made by him with reference to the cases grouped under A, namely, that the deflection here can not be due to attempts at exclusion by one eye, inasmuch as the deviation behind the screen and the deviation in binocular vision are the same.

¹ Von Graefe (2) and Theobald (3).

2. His hypothesis, when applied to the cases of Class C, does not account for the fact that in a case like ours, and probably in most cases, the *deviation increases steadily and with perfect uniformity* from the point of equilibrium outwards, *i. e.*, as the gaze is directed successively at objects more and more remote. If the deviation were due to any of the changes that he alleges, we should expect to find it developing suddenly and showing no special tendency to increase after it had once developed.

3. If the deviation was of purely myopathic origin, it *ought to increase as the gaze is carried toward the side of the squinting eye*; for here the relatively inefficient contraction of the too long and lax externus is opposed to the excessive and increasing tension of the tightly stretched, too short internus. For the same reason, the range of excursion outward of the squinting eye should be diminished, and its excursion inward increased, very much as occurs in cases of old paresis of the externus with consecutive contracture of the internus.

Now, while in true concomitant squint, particularly in the inveterate cases, this increase in the inward and decrease in outward excursion almost invariably obtains, this is by no means the case in periodic strabismus. Indeed, as in our case, the opposite condition may prevail. This would indicate that, while there is a myopathic element in most cases of squint, it is not the only factor in producing this condition; and that when it is present it is often late in developing and presumably, therefore, secondary to another factor that is itself the primary cause of the deviation.

Is it, indeed, at all certain that the conditions which von Graefe invokes to explain the development of concomitant squint are by themselves *competent to produce it*? In other words, can a concomitant deviation be produced simply by one tendon being too short and tight, and the opposing tendon being too long? Will not such a condition rather produce a non-concomitant squint, increasing markedly in some one direction of the gaze, like that due to a paresis or contracture? The results of tenotomy would seem to indicate that this question must be answered affirmatively. For

this operation, by shifting the insertion of the tendon, reproduces in a measure the conditions that, according to von Graefe, are competent to cause a concomitant squint. Yet the changes that it sets up in the position and movements of the eye are not those of a concomitant squint, but rather those of a paresis of the muscle tenotomized. . I have had repeated occasion to verify this fact when examining patients that had had complete or partial tenotomies of either the lateral or vertical muscles, and who even years afterward showed in the outskirts of the field of fixation diplopia or other evidences of deviation, increasing precisely as they would if the muscle operated upon had been rendered paretic.

It must be added that the considerations above presented apply with even greater force to the case of *periodic divergent squint*, both latent and manifest. Indeed, the inadequacy of the explanation that regards all cases of this sort as being due exclusively to insufficiency of the interni or to variations in length or to improper insertion of these muscles, has long been recognized. The very term "insufficiency of the interni" has been largely given up and replaced by the term "insufficiency of convergence," as more adequately representing the facts.

INNERVATION THEORIES OF SQUINT.

If the myopathic element is not adequate in itself to account for all the phenomena of periodic and concomitant squint, what other factor shall we invoke to explain them? The answer to this question has been found in the various neuropathic or innervation theories that have been from time to time propounded. As so far elaborated these theories explain satisfactorily two conditions, viz. :

- (a) Convergence-excess.
- (b) Convergence-insufficiency.

To comprehend exactly what is meant by these terms, it is necessary to recall the precise nature of the function affected in both—namely, convergence.

Convergence is a bilateral function; that is, it is a movement of adduction which is performed simultaneously in the

two eyes and which is always precisely equal in the two. Pathological evidence, moreover, demonstrates it to be governed by a special nervous mechanism, quite distinct from that which regulates the adduction of either eye when executing parallel movements with its fellow. Interference with this mechanism, therefore, will result in a bilateral deviation, *i. e.*, one equally divided between the two eyes, and one which will become marked whenever any attempt is made to converge the eyes; while, on the other hand, the ability to maintain adduction in performing associated parallel movements will be neither increased nor diminished.

This fact constitutes the essential difference between the innervational and the myopathic conceptions of the origin of squint. According to the latter, squint is an essentially unilateral phenomenon dependent upon some interference with the individual muscles of one eye. According to the innervational theory, squint is a bilateral affection which concerns a centre governing one of the combined movements of the two eyes.

From the latter point of view, **convergence-excess** is an affection in which the *interni per se* may be normal, but the convergence centre is acting to excess. The resulting symptoms are as follows (8): Esophoria or actual inward squint, particularly apparent whenever any attempt is made to converge the eyes—hence, particularly marked at middle distance and near points, and in typical cases steadily increasing as the object looked at is approximated to the eyes. Primary and secondary deviation behind the screen, equal. Near point of convergence excessively close to the eyes. Prism-divergence (so-called abduction) in moderate cases but little reduced. Prism-divergence (so-called adduction) normal and performed with ease. Lateral movements of the eyes normal in extent.

Convergence-excess comprises a very large number of the cases of periodic convergent squint, embracing those described by von Graefe in his Class B (see above, page 265) and probably also a large proportion of his Class A. It includes the ordinary form of accommodative convergent squint in young children, when it is still periodic, and very

numerous cases of heterophoria, whether accommodative or not. The convergent squint produced by the instillation of atropine is an example of it (8). As need scarcely be said, it usually passes over into a permanent squint, although when this takes place the condition no longer exhibits the characters of a pure convergence-excess, for the deviation has become equally marked for distance and near, the diverging power of the eyes has diminished, and the lateral movements of the eyes are no longer normal; abduction being increased, and adduction diminished. In fact, other innervational anomalies (divergence-insufficiency) and anomalous conditions of the muscles themselves (contracture of the interni, stretching and consequent weakness of the externi) have been superadded.

The opposite condition, or **convergence-insufficiency**, (the extreme degree of which is **convergence-paralysis**) has also been known for a long time.¹ Its characters, when uncomplicated, are: Exophoria or actual divergent squint, particularly apparent when an attempt is made to converge the eyes; hence, particularly marked at middle distance and near points, and in typical cases increasing steadily and uniformly as the object looked at is approximated to the eyes. Primary and secondary deviation behind the screen equal. Prism-convergence (so-called adduction) difficult to perform and often absolutely deficient. Prism-divergence (so-called abduction) not much in excess of normal, or often, indeed, subnormal. Near point of convergence abnormally remote from the eyes (25 or 50 centimetres, or in case of marked paresis of convergence, 1 to 4 metres). Lateral movements of eyes normal.

This anomaly of convergence is quite frequent. It includes the accommodative exophoria (or divergent squint) developing in myopes who do not wear concave glasses, and also temporarily developing in hypermetropes and presbyopes who put on convex glasses for the first time. It also comprises cases in which there is no accommodative ele-

¹ Thus by Schweigger (1881), Parinaud (1883), A. Graefe (1884), and a number of other authors. A list of these with a detailed consideration of the whole subject is given in the author's *Motor Anomalies of the Eye*, pp. 71-78.

ment. It is, in fact, the old "insufficiency of the interni" under another name. As is well known, it tends, provided the accommodative element is not eliminated, to increase progressively, so that what is at first simply an exophoria develops into a periodic divergent squint, and this itself later develops into a constant squint. But by the time that this has occurred the deviation no longer exhibits the characters of a simple convergence-insufficiency, for the deflection is now pronounced for distance as well as for near, the diverging power of the eyes is abnormally great, and the lateral movements of the eyes are no longer normal in extent; *i. e.*, there has been superadded to the original condition new anomalies of innervation (divergence-excess), and also anomalies of the muscles themselves (actual weakness of the interni and contracture of the externi).

DIVERGENCE AND ITS ANOMALIES.

The great proportion of cases of heterophoria and of periodic squint can, if examined in their incipient stages, be classified under the one or the other of the two anomalies of convergence, just described. This is not true of the more advanced cases, in which, as already stated, other factors are present and combine with the excess or insufficiency of convergence in producing the deviation. But even when examined at the outset not all cases of exophoria exhibit the characters of a convergence-insufficiency, nor do all cases of esophoria arise from a convergence-excess. For example, the case here described cannot possibly be attributed to the latter. The deviation, is marked for distance and diminishes progressively as the object of fixation is approximated to the eyes—*i. e.*, is most pronounced when no attempts at convergence are made, and becomes less and less marked in proportion as the eyes are used for converging. It cannot therefore be ascribed to an anomaly of convergence..

What other function then beside convergence can be affected in this and similar cases?

My answer to this would be that the **function affected is that of divergence**, or that by virtue of which the visual

lines when converged upon a near object are made to separate in order to sight an object more remote. Like convergence, this function is a strictly bilateral one, the movements executed being precisely equal and simultaneous in the two eyes. In their nature these movements may be regarded as consisting either in a simultaneous relaxation of both interni (*passive divergence*) or in a simultaneous contraction of both externi (*active divergence*).

Alfred Graefe (9) strongly opposes the hypothesis of an active divergence, urging against it the well-known fact that even when the externus is completely paralyzed the affected eye can still return just like the normal eye from a position of extreme convergence to the median or "*eyes-front*" position. This argument seems to be a strong one in favor of regarding the act of divergence as due not to any active contraction of the externi, but to the simple elastic pull exerted by the latter when the interni relax. Nevertheless, arguments for the opposite view are not wanting. Thus, while it is true that in paralysis of the externus the eyes can still diverge, *the paralyzed eye cannot diverge as far as the middle line*. Even in incomplete paralysis of the left externus, for instance, in which the affected eye can still move outward 1 or 2 mm, the left eye shows a convergence of several degrees when the right eye is directed straight ahead; and in marked paralysis of the left externus, even when entirely recent and when therefore there is no question of there being a contracture of the internus, the homonymous diplopia and the convergence as shown by the phorometer and by alternate covering persist up to 15° or 20° to the right of the median line.¹ This is surely an argument for believing that the muscular action of the externus by no means ceases at the middle line, but is carried on for some distance at least to the inner side of the latter.²

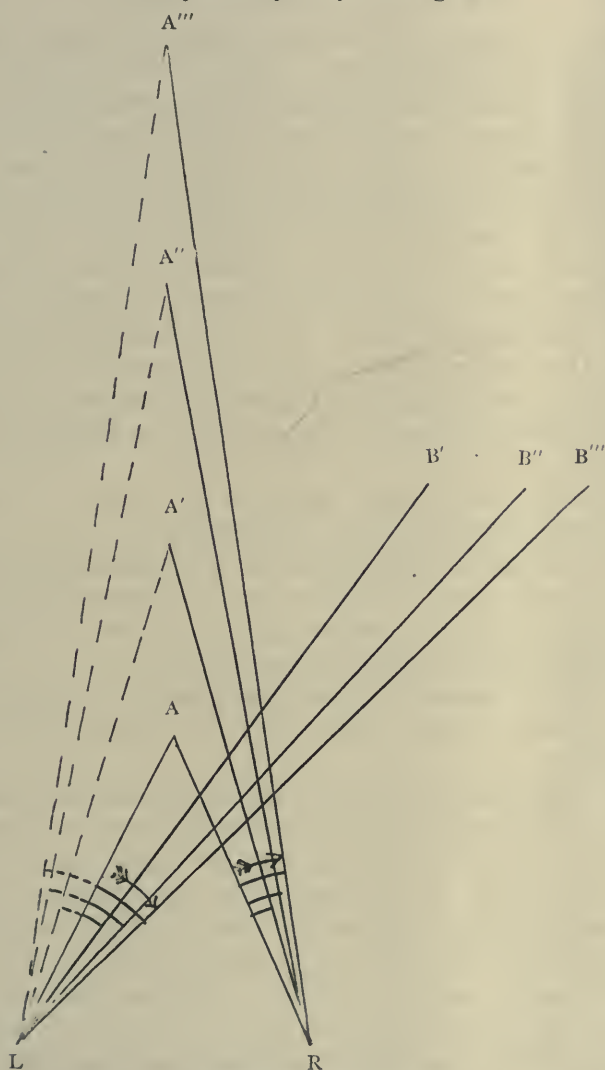
¹ Thus in a case that I saw at the Vanderbilt Clinic, in which the paralysis had developed the day before, and did not become complete until one or two days later, there was homonymous diplopia up to 20° to the left of the median line. In another case of five or six weeks' standing and also not quite complete, diplopia was present at least 15° to the inner side of the median line.

² The argument (*Mauthner*) that the diplopia in the "*eyes-front*" position in these cases is due merely to loss of tone on the part of the paralyzed muscle is simply another form of this statement, since muscular tone is nothing but residual muscular contraction.

Again the *sense of muscular strain* not infrequently experienced in the attempt to overcome prisms base in, and the ability possessed by some to produce (apparently by an active muscular contraction) a voluntary crossed diplopia of many degrees when the eyes are fixed upon distance, are indications that the function of divergence is in part at least an active process.

My own view is that *this function is probably both an active and a passive process, i. e.*, that when the eyes diverge from a position of extreme convergence, the movement is initiated by a relaxation of the interni, whereupon the eyes begin to return to the mid-position by virtue of the elastic pull exerted by the stretched externi; and that, after a large part of the double outward rotation has been effected by this mechanical means, the active contraction of the externi comes into play as a reinforcing factor and completes the divergence (through some 10° – 12° of arc). This view seems fortified by two considerations: (*a*) If the eyes diverge solely in virtue of the elasticity of the externi, the movement ought to be much more rapid at its outset, when the externi are strongly stretched, than at its end; and the fact that the movement does proceed rapidly at its end would seem to indicate that in this part of the excursion the diminishing traction power of the externi considered simply as elastic cords, is reinforced by some other factor which can only be an active contraction of these muscles. (*b*) Both in paralysis of the externus and in cases of the kind recorded in this paper, while the initial part of the movement of divergence is carried on smoothly and without interruption, the terminal part is either done imperfectly or is abolished altogether, indicating that some factor that was essential for its performance has been removed by the paralysis.

But, whether this view is correct or whether, as Graefe says, divergence is a purely passive process, he and similar reasoners go too far in arguing that if divergence is not effected by an active contraction of the externi, it cannot therefore be governed by a *distinct nervous mechanism*. It surely is quite reasonable to believe that the delicate co-ordinated action required for a simultaneous and equal relax-



DIVERGENCE PARALYSIS.

The paralysis is such that both eyes naturally tend to converge so as to be directed at the point A. When the attempt is made to sight the point A', farther off from the eyes, the eyes cannot, as they would naturally do, move simultaneously outward through the equal angles $\angle A'LA$, and $\angle A'RA$. The only way in which one of the eyes can sight the point A', is for that eye to move outward while the other eye moves inward to an equal extent. This it can do, since the power to perform associated lateral movements is unimpaired. Hence as R moves out through the angle $\angle A'RA$, L moves inward through the equal angle $\angle A'LB'$. Hence it is directed at B' instead of A', so that the deviation is represented by the angle $\angle A'LB' = 2 \cdot \angle A'RA$. So, as the right eye turns still farther out to A'', A''', etc., the left eye turns still farther in to B'', B''', etc.

ation of the interni should itself demand a special nervous apparatus to preside over it. The existence of inhibitory as well as of directive nervous mechanisms is generally admitted by physiologists. And it seems scarcely conceivable that a mere letting go of the contracted interni, ungoverned by some nervous mechanism, could enable the eyes to pass smoothly, equally, and with unerring precision from one position of convergence to another and finally to parallelism.

At any rate, the question is not one to be decided upon *a priori* grounds, but by the result of clinical examination. And, if we can find a case in which this function is abolished and other functions are intact, it will go far to prove that the function itself is under the control of a distinct nervous apparatus.

What then would be *the symptoms of a case in which the function of divergence alone was abolished?*

(1) The power of either eye for moving laterally in conjunction with the other eye would be unimpaired (difference from paralysis of the externi *per se* or from a conjugate paralysis of associated lateral movements).

(2) The function of convergence would be unimpaired, but yet not excessive (difference from ordinary convergent squint).

(3) The eyes would tend to assume a position of convergence, and when converged could not diverge in the ordinary way, *i. e.*, neither eye can turn out if the other eye also turns out, so that if A represents the point to which the two eyes naturally converge, the right eye, R , cannot be directed at the more remote point, A' , provided the left eye, L , turns out so as to be also so directed. But R can be directed at A' by executing an associated parallel movement with L , *i. e.*, can move out, if L at the same time moves in to an equal amount, so as to be directed to B' . The left eye now squints in through an angle $A'LB'$. As the right eye turns out more and more to look at successively remoter objects (A'' , A''' , etc.), the left eye keeps turning in more and more (to B'' , B''' , etc.), so that the angle of squint gets larger and larger ($A''LB''$ $A'''LB'''$). The deviation and consequent diplopia therefore, will increase *pari passu* as the object is

removed from the eyes (difference from ordinary convergent squint).

(4) The deviation and the diplopia will also diminish as the eyes are carried to the right and to the left (difference from paresis of the externi). This diminution will be marked and be present in tests made both for distance and near. The reason for this is that in the extreme lateral directions of the gaze the eye that is turned inward is better able to diverge from mechanical reasons, because its externus is strongly on the stretch.¹

(5) Prism-divergence, or the ability to overcome prisms base in, should theoretically be diminished or abolished both for distance and near. For, the ability of the eyes to overcome prisms base in is simply the measure of their capacity for separating from each other (diverging), and not at all a measure of the intrinsic power lodged in their externi. And while it is true that a marked weakness of the externi is necessarily associated with an impairment of the prism-divergence, the converse is by no means true, and inability to overcome prisms base in does not necessitate the assumption that the externi *per se* are at fault, any more than deficiency of convergence necessarily means that the interni are defective. In cases of the sort here considered, the externi as such act normally, but as the power of the visual lines to move simultaneously away from each other is lost the eyes cannot diverge so as to overcome a prism base in.

Such are the symptoms that should theoretically be shown by a case of paralysis of divergence. In the case reported they are reproduced with absolute fidelity. The same is true of the cases of Uhthoff and Straub. The conclusion seems irresistible that, as these authors and Parinaud pointed out, such a paralysis is the actual causal agent in producing the deviation.

It is noted that in this case the results of examinations made at different and wide intervals of time are altogether consistent. Thus when Dr. Pischel examined the patient

¹ Also, according to Straub (7), because in the lateral positions of the gaze the maintenance of convergence is more difficult.

four years ago, the condition was evidently much the same as now, only a little more pronounced, since there was for distance a prismatic deviation of 34° corresponding to an actual convergence of about 20° . Then as now there was obviously a progressive diminution of the esophoria in proportion as the object of fixation was brought closer to the eyes, for at 40 centimetres the convergence was reduced to 11° (actual deviation = 20° prism). This is precisely what it should have been granting that it was due to a divergence-paralysis. By the same theory, the actual point of equilibrium or orthophoria then should have been at 17 centimetres from the eyes.¹ By the operation this point of equilibrium was carried out to 40 centimetres, but in its essential character the condition was unchanged, since the esophoria increased from this point out until, at distance, it amounted to 14° (prismatic), representing an actual convergence of 7° (the theory of a divergence-paralysis would call for $8\frac{1}{2}^\circ$). At present the degree of convergence for distance is 14° (actual deviation), which, according to the theory of a divergence-paralysis, would correspond to a point of equilibrium situated 24 centimetres from the eyes. As a matter of fact, this point by actual measurement lies between 17 and 22 centimetres.¹ So closely do the facts in all three observations correspond to the theory.

Apart from these instances of complete paralysis of divergence, I have had occasion, now and then, to observe cases which have seemed to me undoubtedly to be minor examples of the same anomaly, being due, that is, to a *moderate insufficiency* instead of a pronounced paralysis of divergence. In this category I should include the cases in which there is well-marked esophoria for distance, with orthophoria or even exophoria for near and with the convergence near-point at normal distance; prism-divergence (abduction) quite restricted (from 1° to 3° for distance, and comparatively small also for near points); and no limitation in the ability of the eyes to swing inward and outward in performing associated parallel movements. These cases include

¹ That is, from the base line connecting the centres of rotation of the two eyes.

some of the most difficult that I have had to treat, asthenopic symptoms being often marked, and correction of the refraction having no effect in relieving them. Nor did simple tenotomy, as a rule, help them, although it has done so in some instances (*e. g.*, one case of Uhthoff's). In fact tenotomy is not in principle the proper operation in these cases, since what we wish to effect is not to diminish the opposing power of the interni (or of convergence) which is not excessive, but to increase the diverging power *per se*; and the only adequate means that we have for doing this is to advance the externi.

According to my observation, divergence-insufficiency occurs more frequently as a condition *secondary* to convergence-excess than it does as a primary condition. It then helps to increase the deviation due to the convergence-excess, and to render it constant and concomitant.

For the sake of completeness, it remains to consider **divergence-excess**, or the state in which the eyes tend to diverge too strongly. The symptoms of this are (8): Exophoria or divergent squint more marked for distance than for near. Near point of convergence in uncomplicated cases not abnormally remote. Prism-divergence (so called abduction) excessive absolutely, and often also relatively so as compared with the degree of exophoria. Prism convergence (so called adduction) generally normal in the uncomplicated cases. Lateral movements of the eyes normal in nature and extent.

This condition occurs either as a primary affection or as an affection secondary to a convergence-insufficiency; in the latter case serving to increase the degree of divergence and to render it constant and concomitant. This same evolution of a constant and considerable deviation from a small and periodic one may also be effected in the case of a primary divergence-excess, to which a convergence-insufficiency or a true muscular anomaly (contracture of the externi, stretching and consequent weakening of the interni) has been superadded.

Cases of divergence-excess, both simple and complicated, are, as far as my experience goes, fairly frequent.

COMPLEX ORIGIN OF CONCOMITANT SQUINT. ITS ETIOLOGICAL CLASSIFICATION.

In emphasizing the importance of the anomalies of convergence and divergence in producing heterophoria and squint, I do not mean to minimize *the importance of strictly muscular anomalies* as causal factors. A certain number of cases are undoubtedly of muscular origin. Such, for instance, are many of those described by von Graefe in his Class C above given (particularly the cases in which there is actual restriction of outward movement). Another set of cases, comparatively common, are those in which a congenital over-development or under-development of the internus or externus is the original cause of the squint (muscular squint) (6). A third variety still is comprised in those cases that originate in slight degrees of paralysis of the individual muscles; the paralysis in this instance being generally associated with contracture of the antagonistic muscles.

Apart from these cases of purely myopathic origin, it must be admitted that most cases of squint that have lasted for a long time have a myopathic element, the muscles becoming stretched or contracted, so as to be no longer normal in action. In the foregoing pages, in treating of convergence and divergence anomalies, this fact has been repeatedly emphasized. And, I think, the more we look into the subject of strabismus, the more we shall find that to produce any permanent and considerable squint two or more factors must combine. Such a combination is not fortuitous, but proceeds in accordance with the law elsewhere enunciated :

"A non-concomitant deviation usually tends to become concomitant, there being superadded to the conditions already existing another by means of which the former is generalized and rendered sensibly equal throughout the whole field of fixation" (8).

Per contra, it may be said that the very fact of a squint being concomitant is *prima-facie* evidence that the squint is of complex origin.

In the light of these considerations, we should, I think, explain the pathogenesis of squint and heterophoria as follows :

EXOPHORIA AND DIVERGENT SQUINT MAY BE DUE TO

1. Under-action of an adductor (insufficiency in the true sense of the word) or over-action of an abductor, due to abnormalities in structure, insertion, or innervation (*muscular squint* or *exophoria*). Not very frequent by itself, but frequent as a complication.

2. Over-action of the diverging power (*divergence-excess*). Fairly common.

3. Under-action of convergence (*convergence-insufficiency*). Very frequent. May be either accommodative (in myopes) or non-accommodative.

4. One or more of the above anomalies combined (*mixed conditions*). Such a combination usually obtains in long-standing and marked cases of concomitant divergent squint.

ESOPHORIA AND CONVERGENT SQUINT MAY BE DUE TO

1. Under-action of an abductor (true insufficiency) or over-action of an adductor, due to abnormalities in structure, insertion, or innervation (*muscular squint* or *esophoria*). Not very common by itself but frequent as a complication.

2. Over-action of convergence (*convergence-excess*). Very frequent. May be either accommodative (in hypermetropes) or non-accommodative.

3. Under-action of the diverging power (*divergence-insufficiency*). Rare.

4. One or more of the above causes combined (*mixed conditions*). Such a combination usually obtains in long-standing and marked cases of concomitant convergent squint.

It is by following an etiological classification like this that we attain, in my belief, the best success in both diagnosis and treatment.

BIBLIOGRAPHY.

1. ALBRECHT V. GRAEFE, *Arch. f. Ophth.*, iii., 1, pp. 177-386.
2. ALBRECHT V. GRAEFE, *Arch. f. Ophth.*, x., 1, pp. 156-175.
3. S. THEOBALD, *ARCH. OF OPHTH.*, 1886.
4. ALFRED GRAEFE, *Bericht. d. VII. Ophth. Cong.*, 1888.
5. UHTHOFF, *Berl. klin. Wochenschr.*, No. 16, 1893.
6. SCHNELLER, *Arch. f. Ophth.*, xxiii., 3, p. 138.
7. M. STRAUB, *ARCH. OF OPHTH.*, xxv., 3 (1896).
8. A. DUANE, *Motor Anomalies of the Eye*, 1896-1897.
9. ALFRED GRAEFE, *Graefe-Saemisch Handbuch d. ges. Augenheilk.*, VIII., xi., p. 70 (2d Ed., 1899).

A FURTHER CONTRIBUTION TO THE EXTRACTION OF PARTICLES OF STEEL OR IRON WITH HAAB'S LARGE ELECTRO-MAGNET.

BY A. BARKAN, M.D., SAN FRANCISCO.

FIVE cases of extraction of particles of iron with Haab's large electro-magnet having been previously reported in these ARCHIVES, I beg to submit seven more cases as a further contribution to this important branch of ophthalmic surgery.

CASE 6.—A chip of iron perforating corneo-scleral junction, extracted through fresh corneal incision, together with large shred of iris. Recovery.

John Marten, of Grass Valley, referred to me by Dr. V. Jamieson, was hit in the left eye by what he supposed to be a fragment of rock, flying from a pick, on the 24th of February, 1898.

On examination the following day I found a sharp, perforating injury, two lines long across the cornea, well into the sclerotic. Blood filling anterior chamber. $T + 1$; $V =$ quantitative perception of light. Projection very uncertain. Slight pain and sensitiveness to touch. Doubting the patient's statement as to the rocky nature of the foreign body, I proposed using Haab's magnet as a sideroscope, and did so with an immediate positive effect, for the patient felt a piercing characteristic pain through the eye, as if from a sharp foreign body moving to the front, although no change was visible in the eye. This being late at night, the extraction was deferred till the next morning. The following morning, finding the wound closed, I disliked to reopen it, as it lay near and in the ciliary body, and wishing to avoid a renewed traumatic lesion of this zone by the extraction of foreign body, I

made a fresh incision into the lower third of the cornea with a large lance, which was followed by copious evacuation of blood from anterior chamber. Patient's eye was placed before the magnet; then severe pain, corneal wound bulging forward towards pole of magnet. After enlarging the wound with scissors, a large metallic foreign body, weighing 1.26 mgrm, $5.4 \times 4.7 \times 2.5$ mm, was promptly extracted, and with it an unpleasantly long piece of iris, which was clipped off smoothly; no loss of lens or vitreous; atropin, bandage, bed.

During the following ten days the eye improved fairly well under ordinary treatment; on March 4th, hemorrhage was partly absorbed, projection of light, corneal wounds healed.

March 25th.—Pericorneal injection lessened daily—very slight now. Stands light well. Lower half of cornea, along instrumental wound, slightly hazy. Anterior chamber exists only partly on account of loss of upper $\frac{2}{3}$ of iris; its lower third is preserved; partial anterior synechia, reddish reflex from background, no details. Projection fairly good. T = 0.5. No pain, hardly any soreness on touch; sees motion of hand.

April 5th.—Eye further improved.

April 15th.—Sees fingers indistinctly; abundant opacities in vitreous; fundus not visible.

June 15th.—Large corneal scar, extending to lower margin; upper $\frac{2}{3}$ clear. Lower piece of iris adherent to corneal scar. Lens in apparently normal position, and clear except joint-like opacities in anterior and posterior capsule; equator of lens visible in upper $\frac{1}{4}$ of its circumference, some bits of ciliary and iris pigment adherent to it. T normal; eyeball entirely free from inflammation, not sensitive to touch; V = counts fingers in five feet. Patient well satisfied to have his eye and a little reserve sight.

This was my first case in which extensive loss of iris ensued. Was it unavoidable? No! A clean and efficient enlargement of the sclerotical part of the wound might have opened a convenient exit for the foreign body, although some of the ciliary processes might have been dragged along, as was the iris, with a possible subsequent loss of the eyeball. In such a case the perforating point being partly in the ciliary region, it might have been advisable to follow Knapp's advice and make a fresh meridional opening between external and inferior rectus, holding the lips of the

wound apart with a platinum hook, and extract it through it. The magnet as the "iron-finder" was quite satisfactory.

CASE 7.—Large hook-shaped piece of iron entered through cornea, entangled in and behind iris. Extraction good. Recovery.

June 2d.—William O. Bain, thirty-five years of age, machinist of Carson City, Nevada. While chipping with chisel and hammer a piece of steel, a particle struck the man's left eye. Pain was severe—had to close both eyes; presented himself, being kindly advised to do so by Dr. Hufacker, at my office the following day.

Status præsens: Slight swelling of upper lid and palpebro-frontal fold, slight photophobia and lachrymation and pericorneal injection. In centre of cornea, coinciding with vertical meridian linear scar 2" long across the pupil; adjoining corneal area opaque. Iris shows commencing discoloration. Pupil contracted and pear-shaped; looking downward, red reflex of fundus visible, possibly also metallic lustre of foreign body; its location in the eye, uncertain; condition of lens not ascertained. No fundus details. T slightly diminished; no sensitiveness to touch; V, left = $\frac{15}{200}$. Pupil enlarged well under atropia, except in part to which probably foreign body is adherent.

In order to prevent a loss of iris as in Case 6; and in order to pave the way for the foreign body, a small iridectomy was made to the inside of the limbus; a trifling hemorrhage ensued. Large magnet *attracts*, but does not *extract*, the foreign body. Haab's magnet of no effect, the wound being too small. After a slight enlargement, the same *Haab magnet* easily removes the foreign body, which had become entangled in the iris by a very ill-shaped, hook-like end. No loss of iris, lens, or vitreous. Foreign body, 2 x 4 mm; weight = 6 mgm. Atropin, bandage, bed.

June 8th.—Wound healed; pupil well enlarged; capsule torn by foreign body; numerous radiating opacities in the lens. Fundus indistinct. V $\frac{3}{200}$.

June 9th.—V $\frac{6}{200}$; lens becomes absorbed gradually during the following two months. Eye is strong and natural-looking. Final vision = $\frac{3}{8}$ with + 9.

CASE 8.—Successful removal of foreign body from vitreous; partial retinal detachment, probably before extraction.

Eugene Smith, tinsmith, Fresno, kindly sent to me by Dr. Minor, had his left eye injured while hammering piece of steel.

On examination, August 11, 1898—a day after the injury,—there was a slight pericorneal injection, little more marked toward spot situated just below outer end of horizontal meridian, within limbus, about the size of a small lentil—evidently the point of injury. Directly behind spot a slight linear defect in iris, near ciliary insertion, which transmits light. Pupil well enlarged. Lens clear. Floating opacities in vitreous. Looking downward, one long fold is seen, which appears to contain a foreign body. Disc slightly hyperæmic and indistinct; somewhat diminished; slight sensitiveness to touch. $V = \frac{1}{10}$.

Here again it was obligatory to enlarge corneal opening, for although Haab's magnet promptly attracted the foreign body into the wound—it could not get it through—but after enlargement, removal was easy and instantaneous. Foreign body weighed 2 *mgm*; size, 2 x 0.75 *mm*. The eye progressed well for a week. It was then noticed that where the foreign body first was seen, and undoubtedly caused by it, the retina had become detached. No opacity of the lens followed. Fundus became fairly clear, final central vision $\frac{2}{10}$.

CASE 9.—Removal of foreign body from vitreous; panophthalmitis. Enucleation.

Charles Cheeney—kindly sent to me by Dr. Hanson,—workman, twenty-two years of age, consulted me on the evening of the fifth of September. Whilst sharpening saw, the lathe which he was using broke, and a chip from the saw struck him in the left eye.

Severe pericorneal and some conjunctival secretion, beginning chemosis. Cornea quite dull; corresponding to outer half of horizontal meridian is a linear wound about $1\frac{1}{2}$ lines reaching to nearly the centre of cornea. In it lie strings of grayish-white capsular and lenticular substance. Pupil somewhat enlarged after thorough atropinization. Iris dirty and discolored. *Tension* slightly increased; bulb sensitive to touch. Vision has sunk to lowest quantitative perception of light; no projection. After a slight enlargement of the wound upward, the eye was approached to the magnet: immediately ensued easy removal of the foreign body 5 *cgrm* in weight, and 5 x 3 x 1 *mm* in size. Very little vitreous lost; wound was adjusted and eye irrigated; bandage;

the patient enjoyed during the next days very careful hospital treatment.

But the symptoms of panophthalmitis which had already been in evidence when the patient first presented himself, and had even before extraction caused me to frame my prognosis very guardedly, now became more and more decided. There was a yellowish reflex from vitreous, softening and painfulness of the eye, and within six weeks from time of the injury, atrophy of the bulb developed. **ENUCLEATION** was advised and performed.

CASE 10.—Removal of foreign body from vitreous ; panophthalmitis. Enucleation.

Frank Ayenard, of Fresno, was injured in the right eye by a particle of iron, while driving hoops. On January 29, 1898, the day following the injury, he presented himself with an eye foreboding no good.

A considerable swelling of lids—chemosis nearly overlapping limbus,—small perforation $1\frac{1}{2}$ " in the inner and upper quadrant of cornea, prolapsus of iris and lens substance. The latter, together with pus in anterior chamber, made further details unrecognizable. Vision = dim sensation of light ; no projection ; T—1. Considerable pain, and bulb intensely sensitive to touch. It was evident that panophthalmitis had already commenced. Nevertheless, after cleaning and **ENLARGING** the wound, the eye gave up its destructive foreign body ; weight, 7 mgrm ; 1.5×2 mm in size ; it promptly adhered to the pole of the magnet, almost immediately after closing the current. Panophthalmitis still continued ; the abscess broke through the sclerotic. After the cessation of inflammatory symptoms, the eyeball commenced shrinking and remained quite sensitive to touch. **ENUCLEATION** was clearly indicated and performed.

CASE 11.—Extract of foreign body from depth of eye. Recovery with very good projection but little vision.

Mr. A. C. Richards whilst opening a box of jars on October 5, 1898, was struck in his right eye by a piece of steel which presumably flew from the head of the hatchet he was using ; the effect, as expressed by patient, was, as if it was a flash of light.

Dr. Fife, of Red Bluff, referred him to me for consultation the day after the injury.

The interior half of the ocular conjunctiva slightly congested and ecchymotic; 3" from caruncula; the impact of the foreign body noticeable near the sclerotic, but point of perforation not traceable directly. Pupil enlarged well under atropia, lens intact, vitreous filled with blood, hardly any light from the fundus, no foreign body discernible. Patient recognized motion of hand, and projection in all directions correct. No pain nor sensitiveness to touch. Normal tension. Being unable to find a perforation, and considering the promptness and correctness of projection of light, I was uncertain whether a foreign body had really penetrated, therefore, I concluded to make a TENTATIVE EXTRACTION: applying the magnet pole to corneo-sclerotic junction near point of impact. Reaction of severe pain and change of shape of pupil at that point was positive proof that a foreign body had been attracted forward, though not yet visible. A small corneal incision and snipping off of small fold of iris allowed the foreign body, 2 x 4 mm and 1 cgrm weight, to make an expeditious flight towards the magnet pole. Brilliant as was the easy and speedy removal of the foreign body, the visual results were unsatisfactory. At no time were there any reactive inflammatory symptoms. The lens remained clear, but beyond that all remained dark in the background, and with focal illumination a slight tinge of blood color was noticeable where the foreign body had penetrated into the eye. Also floating, grayish opacities, shreds of tissue, possibly torn retina. At no time was there the slightest clearing up of the interior of the eye; and at all times PROMPT PROJECTION, although only motions of the hand were dimly recognized; four months afterwards the eye had become strong to light and perfectly natural-looking. With Zeiss binocular electric lamp a white, irregular-shaped spot was clearly discernible downward, evidently a choroid rupture produced by the impact of foreign body. My prognosis, that sight would still improve, was verified, for $V = \frac{5}{200}$, with further chances of improvement.

CASE 12.—November 23, 1898, Mr. G. Blum, Elk, Mendocino Co., care Dr. L. C. Gregby, engaged in saw-mill: On December 12th, piece of steel flew from a hammer, hitting the left eye; little pain at first. Dr. Gregby, who did not think there was any piece of steel in the eye, prescribed application of eye water. The patient remained in *statu quo* for a week. He came to see me on the 23d of December. Hardly any lid secretion, some pericorneal injection, no chemosis, half a line to the inward from inner

and upper corneal quadrant, sharp, perforating wound, extending $1\frac{1}{2}$ " towards centre of cornea; cornea clear, no anterior chamber, pupil but slightly enlarged. Iris pressed forward against cornea by traumatic cataract; eyeball not sensitive to touch. T — $\frac{1}{2}$. Distinct sensation of light, good projection everywhere. A MAGNET ACTING AS SIDEROSCOPE showed instantaneous bulging forward of cornea; severe pain. Foreign body was easily removed through enlarged wound; weight, 3 cgrm; size, 4 x 2.5 mm. Traumatic cataract was gradually and slowly absorbed, with occasional glaucomatous symptoms. About three months after injury eye is free from pain and irritation. Central part of cornea somewhat bulged forward. V = $\frac{5}{200}$. Vision is likely to improve further.

REMARKS.

In 12 cases of extraction of foreign bodies:

1. Three eyes had to be removed on account of *Panophthalmitis*, which in two cases had certainly set in immediately following the injury. In those cases the magnet did good work, but against impossible odds.

2. Eight eyeballs have been saved, 4 recovered very good vision, 4 partially useful vision; one man died of delirium tremens.

3. I have found it advisable to always enlarge the wound previous to extraction in order to facilitate the exit of foreign body.

4. A meridional sclerotical section might be advantageously tried in cases of perforation of foreign body into the vitreous.

5. Haab's magnet does all that the hand magnet will do; it does more (illustrated in Case 6), but must be used guardedly; compared with the latter it avoids destruction of vitreous and diminishes danger of infection.

6. IT IS A GOOD AND SAFE SIDEROSCOPE.

BULLET WOUND THROUGH HEAD WITH LOSS
OF RIGHT EYE AND VISION MUCH
IMPAIRED IN LEFT.

BY DR. J. H. DELANY,

Oculist and Aurist to St. Vincent's Hospital, Erie, Pa.

February 16, 1899.—J. C. was shot in the head; the ball (32 cal.) entered the right temporal bone just above the zygoma and about one eighth of an inch posterior to its central portion, passing through into the orbit, severing the optic nerve of right eye, passing through body of sphenoid down under the left eye, making its exit just below the zygoma and one quarter of an inch anterior to its centre. There are a few interesting features in this case which I will explain. The bullet in its passage divided the optic nerve completely, close to the optic foramen, causing the eye to protrude, but without rupturing the eyeball. The eye was enucleated and a very careful examination made as to the condition of the orbit, but no fracture or splintering of bone could be detected—in other words, the orbit appeared normal in every respect. The socket was packed with iodoform gauze and a pressure bandage applied. I did not remove this dressing until the third day as the patient felt comfortable and temperature never rose above 100° at any time. The left eye from external appearances looked normal, except some conjunctivitis and œdema of lids, although the patient stated at the time that he could see very little out of it. The eye was washed in a solution of boric acid three or four times a day and a shade applied until an ophthalmoscopic examination could be made, for the patient at this time was very weak from loss of blood and I did not deem it advisable to make the examination at this visit.

February 19th.—Third day after enucleation, removed dressings and washed wound and orbit in solution bichloride 1 to 5000,

as there was a slight discharge. There was also much infiltration of orbital tissues which we generally get in injuries of orbit. Same dressings used and more pressure made with bandage. I also made an ophthalmoscopic examination of left eye at this visit, and found a large subretinal hemorrhage covering about three quarters of the nerve and extending over the macula. Nothing could be made out as to the condition of retina or choroid at this examination, except at two places the blood-clot appeared darker and thicker, the larger spot being just below the nerve and to the temporal side, the other was just under the macula in the form of a straight line. These two spots looked very suspicious, but, as stated above, nothing definite could be obtained. Vision at this examination was as follows: Central vision, counts fingers about eighteen inches; to the temporal side and below the median line, counts fingers about three feet. Vision entirely destroyed above the median line. Iodides were ordered and the patient kept quiet in bed.

February 20th.—Dressed wound and orbit. A slight discharge continues, with orbital infiltration increasing so that the lids are now several times their normal size. Pressure bandage continued. I also made an ophthalmoscopic examination of left eye at this visit and found blood clot rapidly absorbing, so that I could now see the two dark spots mentioned in yesterday's examination plainer, yet could not state just what the condition was. Vision somewhat improved to temporal side, central vision about the same.

February 21st. Dressed wound and orbit. Very little discharge. Orbital infiltration decreasing. Removed two pieces of loose bone from temporal bone on right side, also two pieces through the nose, which, I think, came from the sphenoid bone. In syringing wound the solution would pass out of orbit and nose. Same dressings as on previous visits. Examination of left eye. Could now detect two ruptures of choroid; the larger one just below and to the temporal side of the optic nerve, the other just under the macula in the form of a straight line. These were the two suspicious-looking spots mentioned in my first examination, but, as stated then, nothing definite could be made out owing to the large blood-clot. At this examination I also noticed a large white space surrounding the macula: the veins much dilated and arteries contracted, showing that the circulation has been much impaired. No change in vision.

I did not see the patient again until February 24th, when an examination was made. No discharge from wound or orbit. A small sterilized probe was passed into wound on right side; it entered the orbit with the slightest touch and passed over to the septum of nose. Examination through the nose with the forehead mirror showed that the end of the probe could be plainly seen far above the superior turbinated bone, the septum having been driven to the left by the force of the bullet. The wound in the temple on the right side was kept open by a tent of iodoform gauze so that granulation might start from below. No change in left eye at this examination, except that blood-clot was nearly all absorbed.

February 26th.—Patient came to my office, when a careful examination was made. The wound on right side showed healthy granulations; no discharge, but there was much retraction of lids of right eye. Left eye counts fingers at two feet; to the temporal side, below the median line, counts fingers at five feet; above the median line, vision destroyed. The perimeter showed the field to be as follows: Field destroyed above the median line; below the median line and to the nasal side, 30° ; to the temporal side and below, normal. Just to the nasal side of the optic nerve was a large scotoma. The nerve looked very pale, and I feared atrophy was setting in, so ordered strychnia gr. $\frac{1}{30}$ three times a day.

Patient was not seen again until March 10th, when the wound was entirely healed, with much retraction of lids, so that the patient will be unable to wear an artificial eye. No change whatever in the condition of left eye; by looking down and to the temporal side he is able to see his way through the streets without assistance. Everything connected with the eye quiet at this time, the veins remain dilated, arteries contracted. The nerve still retains that anæmic appearance but no worse than it was February 26th, but as it is a recent case atrophy may still take place.

The most interesting features in this case, to me, are the following. The bullet passed through the bone into the right orbit about its centre (as the probe proved), but did not rupture the eyeball. The only explanation I can offer for this is as follows: the bullet was deflected by the eyeball down in the direction of least resistance, viz., the cushion of fat in which the eye is embedded, and then across, just in

front of the optic foramen ; but a bullet going at such a rapid rate, a person would think that it would pass straight through the eyeball, but such was not the case.

Another point of interest is as follows. A very careful examination was made as to the condition of the orbit after enucleation, but no hole, fracture, or splintering of bone could be detected, but, as stated above, the bullet entered the orbit about its middle on temporal side. My explanation for not being able to detect the bullet hole in the orbit after enucleation is, that the orbital bones are very thin in the living subject and are more in the form of a strong membrane, so that when the bullet passed through these bones fell together again and closed the opening.

THE USE OF THE EXTRACT OF THE SUPRARENAL CAPSULE IN DISEASES OF THE EYE.

BY W. H. BATES, M.D., NEW YORK.

FIVE years ago, while experimenting to determine the therapeutic effect on the eye of the active principles of the ductless glands, I discovered the valuable property of the aqueous extract of the suprarenal capsule. Two years later I read my first paper on this subject before this section of the Academy.¹ Since that time the suprarenal extract has been extensively used both in this country and in Europe, and my claims for it have been confirmed wherever it has been intelligently employed.

It is a powerful astringent. When a drop of the aqueous solution is instilled into an inflamed eye, the conjunctiva of the globe and lids is whitened in an average case in one minute. The effect is very decided. In mild cases the whitening may be more than normal. In severe cases of congestion or inflammation the eye is whitened to an appreciable degree. No case has been found in which the extract did not act. The astringent effect is increased by repeated instillations or by the use of a stronger solution. The cause of the redness has no effect on the result. An eye irritated by a foreign body on the cornea can be promptly whitened by the extract, as well as eyes inflamed from local infection or as a complication of general disease. The effect is usually temporary. In most cases after half an hour the eye looks as it did before the extract was used. The extract is not irritating. It generally produces a cooling sensation in the eye. It has no effect on the nervous system directly. The

¹ *N. Y. Medical Journal*, May 16, 1896.

pupil is not contracted or dilated by it, and the accommodation is never affected. The extract has no anæsthetic property, and when pain was relieved by its use the benefit came from the lessened congestion produced by the extract. A tolerance is never acquired; one patient used the extract daily for six months, and the eye was whitened temporarily by it at the end of that time as in the beginning. No secondary effect was observed; inflamed eyes do not have an increase of congestion or pain after the effect of the extract has worn off. The suprarenal extract does not cause desquamation of the corneal epithelium in normal or inflamed eyes in my experience. Ten experiments were undertaken to determine this with normal eyes in which the suprarenal extract was instilled at short intervals for three hours and no desquamation followed. Five cases with purulent keratitis were subjected to the action of the extract at frequent intervals for one hour without desquamation. A 30 per cent. solution did not cause desquamation of the corneal epithelium in a normal eye after one hour's use. The hypodermic administration of the extract is very painful.

It was observed that the instillation of the suprarenal extract into the eye had an effect on the general circulation as well. Therefore it was necessary to learn what pathological conditions contraindicated the use of the extract. An extensive series of observations showed that the extract might be instilled with safety in the eye in advanced stages of organic heart disease, pneumonia, nephritis, and in other serious conditions. Incidentally it was discovered to be an ideal heart tonic. I was the first to publish its use as a heart stimulant in various forms of heart disease (*Medical Record*, October 8, 1898).

Preparation of the aqueous solution.—Five grains of the dried and pulverized gland of the sheep are mixed with one drachm of water. The mixture stands five minutes and is then filtered. The filtrate contains about 1 per cent. of the extract. A solution of 33 per cent. can be obtained. It may be sterilized by heat or preserved at a low temperature. It cannot be mixed with antiseptics or with any other substances without impairing its astringent property in the

eye. It is best to prepare it freshly when needed. The dried and pulverized suprarenal capsule keeps indefinitely. It can be obtained from Armour & Co., Chicago, Ill.

The solution when properly prepared is of a light brown color. One drop in a normal eye should whiten the caruncle more than normal in less than one minute. It should be emphasized that no other substance can be mixed with it without impairing its astringent property in the eye. I have made many experiments with preservatives. The list includes carbolic acid, glycerine, bichloride of mercury, alcohol, ether, chloroform, naphthaline, trikresol, camphor, boric acid, nitrate of silver, holocaine, cocaine, sodic chloride, and sulphate of iron. All were unsatisfactory either because they precipitated the active principle, or were too irritating when used in the eye, or else were inefficient.

Chemical properties.—The extract is very soluble in water, insoluble in strong alcohol, chloroform, and ether. When dried it is of a light yellow color. The aqueous solution gives with ferric chloride an emerald-green color, and with solutions of iodine a beautiful rose-carmine tint. This fact was first published by Vulpian in 1856 (*Compt. Rend.*, xliii., 663-665). The extract is a strong reducing agent. Abel and Crawford (*Johns Hopkins Bulletin*, No. 76, July, 1897) find that the active principle is a basic substance which they have obtained in the form of a sulphate and hydrochlorate.

Physiological properties.—Oliver and Schäfer (*J. Phys.*, 1895) find that the extract increases the tone of all muscular tissue by direct action. When the suprarenal capsule is removed, the heart and muscular system generally are weakened, with great want of tone in the vascular system. The intravenous injection of the extract obtained from .01 gramme of the fresh gland raised the blood pressure of a dog twice its original height. With digitalis and ergot in larger doses they obtained very insignificant results. The extract contracts the arterioles in the frog after destruction of the central nervous system; from this and other experiments they conclude that it does not act upon the vasomotor centre. Their paper contains an extensive bibliography.

Therapy.—In the treatment of diseases of the eye it is important to remember that the extract is an astringent and nothing else.

CONJUNCTIVITIS.

CASE 1.—A physician, aged seventy, had suffered for two weeks with acute catarrhal conjunctivitis. One drop of the aqueous solution of the extract was instilled in each eye. The reddened ocular and palpebral conjunctiva was whitened in a few minutes, and the disagreeable subjective symptoms disappeared at once. The relief was permanent.

The extract has cured forty other cases of acute catarrhal conjunctivitis with other treatment after one or two instillations. In chronic conjunctivitis the relief is temporary. Purulent conjunctivitis and trachoma were benefited, but never cured by the extract alone.

KERATITIS.

CASE 2.—A boy, aged ten, with interstitial keratitis, received local and general treatment six months without benefit. The cornea was covered with blood-vessels. A few drops of the extract caused all the corneal vessels to disappear. The keratitis was cured in two weeks with the extract and other treatment combined. No relapse occurred after six months.

It was always necessary to use other remedies with the extract in the treatment of keratitis. In suppuration of the cornea the extract did not prevent the formation of pus because it is not an antiseptic.

IRITIS.

CASE 3. A man aged forty suffered from rheumatic iritis at irregular intervals, the attacks continuing three months usually before recovery.

In his last attack the eye was very red and painful. Atropine and cocaine used frequently for half an hour had no apparent effect. A few drops of the extract whitened the eye to almost the normal and the pain disappeared. In ten minutes more the pupil had dilated *ad max.* Two days later the eye was normal and remained so.

The extract is not curative in iritis. It only relieves congestion, and has no beneficial effect on the constitutional cause. In chronic iritis the effect is but temporary. A valuable property of the suprarenal extract is that it materially assists atropine in dilating the pupil by relieving congestion of the iris.

ACUTE DACRYO-CYSTITIS.

CASE 4. A woman aged fifty-two had had a watery eye for years. An abscess formed in the sac, with swelling and redness of the overlying skin and of the eyelids. Pus exuded from the lower punctum on pressure over the sac. The patient suffered agonizing pain, which was not relieved by syringing cocaine into the sac through the punctum. The sac was washed with a weak solution of the suprarenal extract, and the pus was removed by pressing it out of the punctum and down the nasal duct into the nose. The swelling, redness, and pain were entirely relieved, and the parts looked normal in half an hour. The relief was permanent. I believe that without the extract this case would have required surgical treatment.

In subacute and chronic cases of purulent inflammation of the sac, the extract is rarely curative, because an organic stricture of the nasal duct is present.

The extract also has no effect on necrosed bone.

Lachrymal strictures.—The astringent property of the extract is invaluable in making the differential diagnosis between strictures of the nasal duct, due to swelling or inflammation of its mucous membrane, and impervious organic strictures. In the former, the extract finds its way into the nose when syringed into the sac through the punctum, and the stricture can be cured by treatment without operation; in the latter, an impervious stricture is usually present when the extract fails to find its way into the nose after repeated trials.

LACHRYMAL OPERATIONS.

CASE 5. A woman aged forty-two had been operated upon for lachrymal stricture. Cocaine was used alone, the operation was exceedingly painful, and the hemorrhage was copious. A relapse occurred. A second operation was done, using the extract and

cocaine alternately during the operation. The patient was not worried. She said she felt no pain whatsoever, and not one drop of blood was seen. No relapse followed. In a number of other cases with slight hemorrhage from the operation, a relapse was the rule, unless the patient received after-treatment.

Tenotomies and advancements of the eye muscles.—

Short operations on normal eyes are usually done painlessly with cocaine alone. But in nervous people, inflamed eyes, eyes congested after recent operations, prolonged operations, and in bloody operations cocaine does not usually secure complete anæsthesia. In these cases the extract is of great service.

CASE 6. A man aged thirty was so nervous that he promptly fainted when he was told that a tenotomy was indicated on his eye. Cocaine 2 per cent. was instilled thirty minutes without dilating the pupil or producing anæsthesia. The patient was worried. I shall never forget the effect of the extract on this patient. His whole body seemed to relax. The anxious expression of his face disappeared. He smiled and told me that he was all right now. The pupil began to dilate. Cocaine now produced anæsthesia, and the operation was completed satisfactorily. In a number of other cases, hysterical women and in children, it was only possible to operate painlessly after the extract was used.

CASE 7. A man, aged twenty-eight, with chronic conjunctivitis had strabismus. Cocaine increased the redness of the ocular conjunctiva, and did not produce anæsthesia in twenty minutes. The extract whitened the eye more than normal. Cocaine now anæsthetized in a few minutes. A painless and nearly bloodless tenotomy was then done.

CASE 8.—An advancement of the external rectus was made recently. The effect was too great. Ten days afterwards an attempt was made to lessen it by a tenotomy. The eye was still red, and cocaine did not produce anæsthesia until after the extract was used.

CASE 9.—A woman aged fifty was operated upon for advancement of the internal rectus. Cocaine was used alone. Pain and hemorrhage were severe, secondary hemorrhage also followed, and the reaction after the operation was considerable. The result was not satisfactory, and one month later a second advancement was done on the same muscle. At this time, the extract was used

with cocaine. The operation was done without pain, and with slight hemorrhage. No secondary hemorrhage occurred as after the first operation. No reaction followed, and the eye healed without pain. The result was all that could have been desired.

In a number of cases the absence of reaction after operations on the eye muscles when the extract was used was noted.

Cataract extraction.—Usually cocaine is perfectly satisfactory in performing a painless operation. Exceptions do occur. In a recent case after the section was completed, the patient complained that the eye was tender. It was impossible to touch the cornea without pain. Cocaine, four per cent., was instilled frequently for fifteen minutes without producing anæsthesia. The patient complained that the drops hurt. The patient had a bad heart and ether was objectionable. A few drops of the suprarenal extract were instilled. The patient's nerve seemed to return. Cocaine now produced anæsthesia, and the operation was finished in a few minutes. I feel certain that I could not have extracted the lens and obtained good vision in this case without the extract.

Iridectomy for glaucoma.—The extract is valuable in the inflammatory cases in which ether is usually necessary to secure anæsthesia. The suprarenal extract lessens the congestion so that cocaine can act. In one case cocaine was instilled for half an hour without producing anæsthesia. A drop of suprarenal extract whitened the eye. The cocaine anæsthetized the eye immediately, and a painless iridectomy was completed in five minutes from the time the extract was instilled. Darier used it at the suggestion of L. Dor, and reported four cases in which the suprarenal extract whitened the eye and lessened the congestion sufficiently for cocaine to produce complete anæsthesia.

Before closing this short paper I would like to refer briefly to the use of the extract in the nose and elsewhere, especially as the results confirm its use in the eye. Mullen¹ has reported painless and bloodless major operations on the

¹ Mullen, *The American Journal of Ophthalmology*, Aug., 1898.

nasal septum with cocaine and the extract. The ossicles and drum membrane have been removed without pain or hemorrhage with the use of the extract (and cocaine). Swain¹ finds that it reduces enlarged tonsils, besides whitening the nasal mucous membrane. Urethral strictures have been opened in the same manner as lachrymal strictures were benefited. Its ability to reduce granulations in the eye and hasten repair has been observed also in the treatment of ulcers of the leg. I am indebted to Dr. R. W. Wilcox, of New York, for the history of the following case in which the extract showed in a convincing way its ability to secure prompt healing by its astringent property.

A man aged sixty-five was treated three months for a carbuncle without much benefit. The open wound had increased to two inches long, by one inch wide. The granulations bulged beyond the level of the skin three eighths of an inch, and were fiery red. The suprarenal extract was applied to the wound. In ten minutes the granulations were white, and had contracted below the level of the skin. Xeroform (bismuth tribromophenylate) was used as an antiseptic. This treatment was repeated every other day. In eight days the wound was healed.

In conclusion it can be affirmed that the suprarenal extract is an astringent of great value. During the five years in which I have used it no disagreeable effects followed its instillation in the eye. Finally I can but repeat what I said three years ago, that within the limits of its sphere of activity no other substance can take its place.

¹ Swain, *N. Y. Med. Journal*, Dec. 24, 1898.

CONCERNING THE BACTERIOLOGY OF ACUTE CATARRHAL CONJUNCTIVITIS.*

BY C. A. VEASEY, A.M., M.D., OF PHILADELPHIA.

THE first bacteriological examinations of the secretions found in the different varieties of conjunctivitis were, I believe, made by Koch¹ in 1883. Occasionally he found the gonococcus in the discharge of Egyptian ophthalmia and in other cases a small, slender bacillus, closely resembling that found in mouse septicæmia. In 1885, Weeks,² in making a study of the discharges of acute catarrhal conjunctivitis of epidemic character, which vulgarly bore the name of "pink eye," discovered that this bacillus was always present in conjunction with another that was club-shaped. These he succeeded in cultivating; and though at that time he was unable to get a pure growth of the slender bacillus he did obtain pure growths of the club-shaped bacillus. Inoculations of a healthy conjunctiva with the latter gave negative results, but inoculations with the mixed growth gave positive results.³ He therefore concluded that the slender rod-like bacillus was the etiological factor in acute catarrhal conjunctivitis of epidemic character.

The work of Weeks was possibly corroborated by Kartulis³ in Egypt, and certainly by Morax and Beach⁴ in Paris, and still more recently by Weichselbaum and Müller.⁵

* Read in abstract before the meeting of the Section on Ophthalmology of the American Medical Association in June, 1899.

¹ Koch, *Wiener med. Wochenschrift*, No. 52, 1883, vol. xxxiii., p. 1550.

² Weeks, *ARCHIVES OF OPHTHALMOLOGY*, 1886, vol. xv., p. 441.

³ Kartulis, *Centralblatt f. Bacteriology u. Parasitenkunde*, 1887, No. 10, vol. i., p. 289.

⁴ Morax and Beach, *ARCHIVES OF OPHTHALMOLOGY*, January, 1896, vol. xxv., p. 54.

⁵ Weichselbaum and Müller, *Archiv für Ophthalmologie*, vol. xlvii., 1, p. 108.

In 1894, Morax¹ described four cases of conjunctivitis in children, in the conjunctival discharges of which was found the pneumococcus of Fraenkel. In each case only one eye was affected and there was a thin membrane covering the tarsal conjunctiva, which led the author to believe that the pneumococcus produced a membranous conjunctivitis. In this belief he has not been generally supported, but that it does sometimes occur I can bear testimony. I have seen it in a marked degree in two cases following attacks of measles in which, until the bacteriological examinations were made, there was some doubt as to whether the disease was diphtheric, and again in a less marked degree in a third case occurring during an epidemic of the so-called "pink eye." In all three the pneumococcus was found in a pure state.

The next to direct attention to the pneumococcus as a cause of conjunctivitis was Gasperini,² and it is really he who was the first to ascribe to the disease its importance as a contagious affection attacking both eyes and occurring in adults as well as in children.

Parinaud³ records a few cases of mild conjunctivitis occurring in the new-born, accompanied by slight swelling of the lids and muco-purulent discharge, but in whom marked obstruction of the lachrymal canals suggested the possibility of the latter having been the points of origin.

Axenfeld⁴ observed two epidemics of muco-purulent conjunctivitis occurring in school children produced by the pneumococcus. He inoculated the normal conjunctiva and the nasal mucous membrane with the discharge from the affected eye with negative results, and argues that it is possible that some disease of the lachrymal duct or hyperæmia of the conjunctiva must first exist to make the inoculations effective.

In 1896, Gifford⁵ published his results. In his neighbor-

¹ Morax, *Thèse de Paris*, 1894.

² Gasperini, *Annali di Ottalmologia*, vol. xxiii., Fasc. 6, xxiv., supplement, xxv., Fasc. I.

³ Parinaud, *Annales d'Oculist.*, vol. cxiii., p. 780.

⁴ Axenfeld, *Transactions Ophthalmological Society*, Heidelberg, 1896.

⁵ Gifford, *ARCHIVES OF OPHTHALMOLOGY*, July, 1896, vol. xxv., 3, p. 314.

hood, that is for Omaha and vicinity, in the study of all the cases of acute catarrhal conjunctivitis of epidemic character coming under his observation in eight years, he found in almost every case (36 out of 40) not the Weeks bacillus but the diplococcus of Fraenkel. Moreover, he carried the disease from eye to eye by means of the discharge and always found in the discharge from the inoculated eye the same germ; and again, with pure anaërobic growths of the third generation he inoculated the healthy conjunctiva of man with positive results. It would seem, therefore, if Gifford's work is corroborated, that the conjunctivitis produced by the pneumococcus of Fraenkel is entitled to the description "contagious" as well as that produced by the Weeks bacillus.

Junius,¹ of Koenigsberg, in the bacteriological examinations of 60 cases of acute catarrhal conjunctivitis of epidemic character found the pneumococcus in 49. In 31 of these examinations it was found in a pure state, and in 18 it was found mixed either with the staphylococcus or the so-called xerosis bacillus.

Kyle² reports that the majority of cases of conjunctivitis seen by him in Matanzas during the Spanish-American war were produced by the pneumococcus.

Since the publication of Gifford's observations in 1896, bacteriological examinations have been made in a large number of cases of acute catarrhal conjunctivitis of epidemic character that the writer has seen in dispensary and private practice. A portion of these observations were recorded in a paper, by G. E. de Schweinitz and myself, read before the Section on Ophthalmology of the College of Physicians of Philadelphia, in December, 1898. Most of the cases were studied in the dispensary of the Jefferson Medical College Hospital, and I am greatly indebted to Dr. R. C. Rosenberger, the bacteriologist to the hospital, for making a large number of the examinations.

In the short time at my disposal to-day, I can only record briefly my observations as a whole without going into the

¹ Junius, *Zeitschrift f. Augenheilkunde*, January, 1899.

² Kyle, *Columbus Medical Journal*, April, 1899.

detail of the work. Altogether the conjunctival discharges from 64 cases of acute catarrhal conjunctivitis have been examined. Of these 6 contained the micrococcus pyogenes albus (probably the same as the staphylococcus epidermidis albus of Welch), in a pure state, 2 contained a mixed growth of the micrococcus pyogenes albus and the micrococcus pyogenes aureus, 3 contained the bacillus of Weeks accompanied by the club-shaped bacillus, and in another what was supposed to be the bacillus of Weeks was found in the cover-glass preparation but the cultures gave pure growths of the pneumococcus, and 52 contained the pneumococcus of Fraenkel. In 10 of these the pneumococci were mixed with the staphylococci or with some micro-organism, the exact character of which could not be determined, but the former were always present in immensely greater numbers. Those cases in which the micrococcus pyogenes albus or aureus was found were of a very mild character, consisting of moderate redness of the palpebral conjunctiva with slight agglutination of the lids, generally confined to one eye, and with no history of spreading to other members of the household.

The cases in which the bacillus of Weeks was found were under treatment simultaneously with other cases due to the pneumococcus, and it was impossible, though careful studies were made for the purpose, to differentiate between them clinically. It was only through the bacteriological examination that the true nature of each was revealed.

The oldest patient in my list of pneumococcus conjunctivitis was sixty-two years, the youngest five months. In two of the cases the disease was complicated by superficial ulceration of the cornea. I have seen also a number of cases of severe ulcers of the cornea from the scrapings of which the pneumococcus was obtained, but without the characteristic symptoms of contagious conjunctivitis, and to instances like these I do not refer.

The symptomatology of acute contagious conjunctivitis and of pneumococcus conjunctivitis is so familiar to us all that I shall not take the time to describe it in the present paper. One point, however, in which my experience has

been somewhat different from that of Gasperini and Gifford, is that in the pneumococcus conjunctivitis the second eye affected is, as a rule, the more severely inflamed, unless the patient is seen in the very beginning of the disease and the treatment employed for both eyes, even though the second eye be not yet, to all appearances, involved.

A number of clinical observations made during my study of the disease impressed me more than ever of its contagious character before any attempt at inoculations had been made. The following is an example:

In the neighborhood of the Jefferson Medical College six students were lodging in one house. One of these presented himself to me for the treatment of a typical contagious conjunctivitis of a very severe character. In the course of ten days three of the other students of the house presented themselves, similarly affected. With a view to ascertaining why four should have the affection and six escape it, inquiry was made and it was discovered that the four who were affected were accustomed to congregate in each other's rooms, both during the day and evening, whenever at work, and that during the period of the progress of the disease none of them had frequented the rooms of the other six students, or *vice versa*. As the four who had conjunctivitis were in the habit of using indiscriminately the towels and wash bowls of the room they chanced to be in, it was presumed that the inoculations were made in this manner.

To ascertain the actual contagiousness of the affection the following experiments were made:

1. Miss A. P., aged twenty-one years, presented herself for the treatment of a very severe conjunctivitis, presumed to have been due to the pneumococcus; and this was afterward proven to be true, both by cover-glass preparations and cultures. A small amount of the discharge from her conjunctiva was at once transferred with a sterile platinum loop to the healthy conjunctiva of M. A., a male, aged thirty-six years. On the following day there was a sensation of heat and fulness of the eye, which in twenty-four hours more presented the appearance of pneumococcus conjunctivitis, and from the discharge of which were obtained cover-glass preparations and pure cultures of the pneumococcus. The affection was not permitted to progress any farther but was checked by the use of the zinc lotion.

2. An anaërobic culture of the second generation was made on serum agar, according to the method of Fraenkel, from the conjunctival discharge of the first patient, Miss A. P., and while this was still young and the solid growth scanty, two drops of the condensation water were dropped on the healthy conjunctiva of A. M. aged twenty-five years, with a sterilized pipette. In twenty-four hours the eye was somewhat red and there was a moderate discharge, but the typical symptoms were not found until the following day and therefore appeared sometime between twenty-four and forty-eight hours after the inoculation had been made. At this time the symptoms were marked and both cover-glass preparations and cultures gave only the pneumococcus in a pure state. On the third day the discharge was so profuse and the eye so uncomfortable that the zinc lotion was prescribed and the patient rapidly recovered from the attack.

3. A second generation was obtained from a twenty-two-hour-old serum agar growth, primarily taken from a very severe case. As soon as the growths on the solid had begun to appear, a patch of them, together with a thin portion of the underlying solid medium upon which they were growing, were picked up with a sterile pipette of large calibre and transferred to the healthy conjunctival cul-de-sac of A. C., a male, aged twenty-three years. On the following day the eye was not different from normal and the patient had experienced no discomfort whatever. On the morning of the second day there had been slight agglutination of the lids, and a very moderate discharge, but on the third, and much more marked on the fourth day, the lids were so swollen and adherent that they could not be separated until applications of warm water had been made ; and there was a profuse discharge collecting in rolls, and numerous small well spread-out subconjunctival hemorrhages beneath the shiny red ocular conjunctiva. The examination of this discharge, both in cover-glass preparations and in cultures, showed only the pneumococci in a pure state.

Since the above positive result was obtained I have made an unsuccessful effort to repeat it ; and as I never obtained any reaction in two inoculations with the condensation water of a serum agar culture, I wondered, naturally, if the introduction of the small amount of serum agar with the germs had any effect in the result. Several attempts, how-

ever, to provoke irritation or inflammation with sterile serum agar have given me negative results, so I am obliged to believe that in itself it had no more to do with the production of the conjunctivitis than did the condensation water of the anaërobic growth in the former experiment. Why the conjunctiva in this case was so favorable to the growth of the micro-organism it is impossible to say as it seemed, to all appearances, to be normal in every respect.

To recapitulate, it would seem :

1. That for Philadelphia and immediate vicinity by far the most frequent cause of acute catarrhal conjunctivitis is the pneumococcus of Fraenkel.

2. That occasionally it is produced by the Koch-Weeks bacillus, and that the clinical manifestations of both are so similar in severe cases that it is practically impossible to distinguish between them without a bacteriological examination.

3. That the experiments of Gifford showing the contagious character of the disease and its reproduction with anaërobic cultures have been fully corroborated.

4. That it has also been reproduced by the writer with a pure aërobic culture.

5. That it is a disease met with more frequently in young adults, but apparently may occur at any age.

ON THE INJECTION OF A WEAK STERILE SALT SOLUTION INTO COLLAPSED EYES.¹

By HERMAN KNAPP.

AT the March meeting, 1898, of the Section on Ophthalmology and Otology of the New York Academy of Medicine, I mentioned² the case of "a patient ninety-one years of age, whose cornea had profoundly collapsed after a smooth extraction of cataract. The next day, the anterior chamber was restored, but its contents were muddy, and the iris was swollen. I opened the wound and let the aqueous out daily for ten days. The cornea remained intact, the anterior chamber refilled, the aqueous was clear, but the pupil closed." The vitreous had become turbid, and the patient was discharged with perception of light (which later was lost, and the eyeball shrank). This was the only case of infection in 110 extractions during the winter. I added: "*If I should have another case in a feeble, very old patient, where the cornea deeply collapses, I would inject a warm, sterile salt solution into the anterior chamber to prevent the eye, when refilling, from sucking in secretion from the conjunctival sac.*" Dr. Gifford, who was present at the meeting, "thought that this suggestion was a very excellent one" (*L. c.*, p. 365).

Thus far I have only once (Case 3, below) had occasion to introduce a sterile saline solution into the eye from mere collapse of the cornea, knowing that in ordinary cases of the

¹ Communicated, with presentation of a patient, at the meeting of the Section on Ophthalmology and Otology at the New York Academy of Medicine, May 16, 1899.

² See the report of the Secretary in these ARCHIVES, vol. xxvii., p. 364, 1898.

kind the anterior chamber refills quickly, and the lips of the wound apply correctly. That the procedure is harmless and undoubtedly useful, not only in extraordinary cases of sinking in of the cornea, but also in cases of collapse of the whole eyeball, is attested by three cases, which I beg to detail.

CASE I.—*Substitution of cholesterinic aqueous and vitreous humors by physiological salt solution.*

This refers to a man whom I presented to this Society at its March session, 1899. His eye, from which I had, ten years ago, "successfully" extracted a particle of steel with the small magnet through an opening in the outer-lower part of the sclerotic, had preserved its shape, but gradually lost its sight, was filled with cholesterine crystals to such a degree as I had never seen before. Cholesterine crystals were deposited at the bottom of the anterior chamber like an hypopyon of 3 or 4 *mm* in height, and more of them were swimming in the whole anterior chamber, and in and behind the pupil, so that the patient wanted to have the eye removed, because, he said, the eye attracted so much attention that employers would not give him a position. I asked whether he would let me try to remove the glittering disfigurement. He consented. I made an incision into the outer-lower part of the cornea, 3 *mm* from the margin, let the aqueous out, scraped the cholesterine sediment out, and injected five or six small syringefuls (E. Meyer's lachrymal syringe) into the anterior chamber, and through the pupil into the vitreous cavity, until the water flowed out free from crystals. The eyeball did not collapse, for the aqueous and vitreous humors had been replaced by a warm, sterile, 7 : 1000 sodicchloride solution. The anterior chamber was restored, the iris in position, and the pupil black, round, and central. The eye was bandaged, and the patient put to bed. There was episcleral redness for about a week, when the patient was discharged. He returned in a few weeks. The eye was in a pretty good condition ; it showed traces of cholesterine again, but in size, appearance, and motion it was no longer conspicuous. Yet the patient wanted to have it removed. He said it hurt him in the same way as it had hurt him a long time before the operation. As there was a slightly indrawn scar at the lower-outer part of the sclerotic—from the magnet operation,—and as I was convinced that the formation of cholesterine would return, I yielded to his request and removed the eye.

Though the substitution of the liquefied and degenerated vitreous by a saline solution did not benefit this patient, it showed that the procedure could be done with impunity, and it was only a few weeks later that I had an opportunity to try it on another patient, with a very gratifying result, which in all probability will be permanent. The patient is before you, and his history is as follows :

CASE 2.—Filling with a physiological salt solution an eye emptied by a cataract extraction. Perfect recovery.

Mr. W. White, æt. fifty-two, of Oneida, N. Y., had a cataract extracted from his right eye three years ago. It was complicated with atrophic choroiditis, yet the operation and recovery were without disturbance, and he had fair sight. He returned April 18, 1899, with a partially thickened capsule, which I successfully discised, May 21st, with S $\frac{2}{3}$.

The left eye had a tremulous iris and a cataract which oscillated forward and backward with its lower part, the upper being attached to the iris, perhaps to the ciliary body. The eyeball was a trifle softer than normal, light perception somewhat faint, yet projection good, so as to justify the attempt of an operation.

On April 20th, under holocaine anæsthesia, I made an upper corneal section as usual, and endeavored to expel the cataract in its capsule by external pressure. The lens did not present, fluid vitreous escaped freely, while the lower part of the iris moved backward at every pressure. I opened the lens capsule in the upper part by a horizontal incision, and succeeded in expelling the lens by repeated pressure with the thumb on the lower ciliary region and adjacent cornea. I then excised the upper part of the iris with the adherent portion of the capsule. During all this time the watery vitreous had so completely flown out that the scleral capsule lay folded together like a wet piece of linen, over which, in the upper part, the cornea projected like the vizor of a cap. Prepared for the evacuation of the eyeball, I injected into the latter four small syringefuls of a warmed, sterilized, 7 : 1000, saline solution, by which the globe was filled in such a way as to restore its size and shape, make the lips of the wound apply nicely to each other, and replace the iris into its natural position below the black artificial pupil. There was no hemorrhage. The patient counted fingers, and had no pain. The ordinary gauze-cotton dressing, held by a roller, was applied. The recov-

ery was undisturbed. Two days after the operation when the eye was opened the whole pupil was occupied by a large bubble which, diminishing steadily, had disappeared on the fifth day after the operation. In a few days the patient counted fingers at a distance of several feet. May 15th, twenty-five days after the extraction V was $\frac{10}{20}$, field of vision normal; the details of the background, though somewhat dimmed, could be discerned with the ophthalmoscope over the whole fundus. The optic nerve was normal, and the retina in position everywhere.

To-day, May 30, 1899, the patient who will return to his home to-morrow, was examined again. There is a slight tinge of circumcorneal redness when the eye is handled. Field and tension normal, the background seen everywhere without conspicuous changes, the vision $\frac{20}{10}$ fully. No pain or other discomfort in either eye.

CASE 3.—Injection of salt solution into a collapsed eye after extraction of a complicated cataract in its capsule, with great loss of vitreous.

May 24, 1899, Mrs. R. Roseg, æt. fifty-eight, had an upward iris coloboma, the result of an operation preliminary to extraction. The lens was sclerosed. The patient was almost totally deaf. Only the loudest words were heard and often wrongly interpreted. The holocainized eyeball was held downward, the cystotome passed over the upper part of the capsule parallel to the corneal section. The lens was pressed into the regular corneal section, it advanced slowly and escaped within its capsule, followed by a considerable quantity of vitreous. The cystotome had failed to open the capsule, a fact not noticed during the operation owing to the difficulty of handling the patient. The eyeball being considerably collapsed, I injected a small syringeful of salt solution into the anterior chamber, upon which the wound united nicely. There was no bleeding. The eye was bandaged in the usual way and the patient put to bed.

She had some pain during the first night. This having disappeared, and the external aspect of the eye being normal, the eyeball was inspected only on the third day. The wound was closed, some episcleral injection, the pupil and iris somewhat dull, perception of light in every direction.

The eye remained quiet and the pupil cleared up gradually. May 30th, the sixth day, she counted fingers, yet not always correctly. Ten days later, patient discharged. Eye free from

irritation. F. n.—J $\frac{1}{2}$. Counted fingers. Thus far only an operative success.

According to the foregoing observations and experiences I believe I am *justified in recommending the injection of a sterile physiological salt solution* (or of any other sterile and indifferent liquid—for instance, boric acid solution) into the eye with a small syringe under the following conditions :

1. When from lack of vitality in old age or any other cause the cornea sinks in so that the eye collapses in such a way as to prevent the wound from closing exactly, a liquid should be injected until the globe has resumed its shape and the lips of the wound apply correctly.

2. Not only remnants of cataract, but also cholesterine and other heterogeneous substances, including perhaps some movable foreign bodies, may be syringed out of the eye with impunity and success.

3. When during the extraction of a complicated cataract the fluid vitreous escapes in such a quantity that the eyeball collapses either totally or in such a degree as to prevent the closure of the wound, liquid should be injected to refill the globe and make the wound close.

4. When from an operation or an injury the eye collapses, injection of a sterilized indifferent liquid may restore the shape of the globe, facilitate the closure of the wound, and ward off infection from the entrance of conjunctival secretion into the eye.

The above histories demonstrate that eyes whose chances of recovery are unfavorable may be saved by intraocular injection,—saved, I am inclined to believe, in a greater percentage than if such treatment were omitted.

NOTE ON THE USE OF EUPHTHALMIN.

By HERMAN KNAPP.

LAST year Messrs. Schering & Glatz put one gram of hydrobromate of eupthalmin¹ at my disposal for trial in my practice. I found that one instillation of a five per cent. solution had too little effect on the pupil to be of much use. One instillation of a ten per cent. solution, however, showed all the advantages which by other observers had been claimed for it. It dilated the pupil in from fifteen to twenty minutes sufficiently for ophthalmoscopic purposes. In thirty or forty minutes a maximum dilatation was reached in most patients, to examine the equator of the lens and the ciliary region as well as under sulphate of atropia. The accommodation was not left intact, but only so little interfered with that the patients did not complain. In from five to ten hours the pupil returned to its previous state. Eupthalmin has no unpleasant side effects. **As an aid in ophthalmoscopic examinations eupthalmin is without a rival.** I have had it in constant use for the last nine months. Whenever an ophthalmoscopic examination does not discover a clear, healthy fundus, I at once dilate the pupil, for I see no good in spending valuable time in trying to get a satisfactory examination when the pupil is narrow and the media are cloudy. In this regard eupthalmin surpasses all of the atropine and homatropine preparations. As a cycloplegic it

¹ I wrote Messrs. Schering & Glatz, 58 Maiden Lane, New York, that the price, \$3.00 for one gram, would prevent eupthalmin from becoming popular. They informed me later that the Schering Chemical Works, in Berlin, had reduced the price so that they were enabled to furnish eupthalmin to physicians at \$1.75 per gram, including vial.

does not compare with sulphate of atropia, and is even more unreliable than homatropine. In two cases I received the impression that euphthalmin, like atropine, had a tendency to increase the eyeball tension. In many later cases I have not seen this effect any more.

Of late I discovered a new quality of euphthalmin; namely, *it does not irritate the conjunctiva or the skin*. In a cataract patient who, on several occasions, had marked atropine eczema by two or three drops of sulphate of atropia, so that the instillations had to be omitted, euphthalmin instilled several times daily had no irritating effect whatever. I have used euphthalmin also in granulations produced by prolonged use of sulphate of atropia. Under its use the swelling and irritation of the conjunctiva were not increased, but yielded promptly to nitrate of silver or sulphate of copper. I should, however, not omit to mention that it dilates the pupil less powerfully than atropine. I can therefore recommend euphthalmin (10 per cent. sol.), 1st, **for routine use to dilate the pupil in ophthalmoscopy**; 2dly, **as a substitute for atropia in cases of intolerance of that drug**.

NOTE ON THE USE OF HOLOCAIN.

By HERMAN KNAPP.

HOLOCAIN has now been so extensively tested in eye surgery that hardly anything not generally known could be said about it. I may, however, be allowed in brief to state my experience with, and my views on this drug, after a daily use for more than a year.

1st. It is as powerful a local anæsthetic as cocain ; over which it has several marked advantages :

a. It acts (1 per cent. sol.) in a shorter time, one-third to one minute, which makes its use very valuable, particularly if we want to anæsthetize the iris. After a corneal section, either for a glaucoma or cataract operation, we can readily anæsthetize the iris by pressing the wound open and letting one or two drops fall into the gap to reach the iris.

b. It does not interfere with the circulation, which accounts for its alleged germicide properties. Blood being the best safeguard of infection, the outflow of blood during the operation carries also the germs away from the wound. It is a very old experience, that wounds for the extraction of cataracts that bleed never were seen to suppurate. Cocain, by its constriction of the blood-vessels and other tissues, sucks tissue juice and germs inward, and thus favors infection. Cocain, causing anæmia, *has the advantage over holocain 1st in the diagnosis of vascular organs*—for instance, the swelling of the turbinals of the nasal passages, and *2dly in facilitating the performance of operation*. A combination of the two may unite the advantages of both.

c. Holocain does not dry the cornea so much as cocain

does. I cannot confirm the statement of authors that it does not dry the cornea at all. Holocain, not interfering with the circulation, possibly dries the cornea only because the anæsthesia gives no incentive to winking. Be this as it may, I have often noticed in cataract extractions that I had to let a drop of liquid fall on the cornea after holocain anæsthesia as well as after that of cocain, only not in the same degree.

2d. **For operative work on the eye, especially on the cornea, I have almost completely substituted holocain for cocain.** For the removal of foreign bodies holocain is an ideal anæsthetic. It renders the cornea insensible in half a minute, and does not suck in germs that may have contaminated the foreign body.

3d. **Cocain is an anæsthetic but no remedy.** In all painful diseases of the outer coats of the eye, it ought to be replaced by holocain. If in contagious ophthalmia we instil cocain into the conjunctival sac, we may relieve the pain, but with the tissue juice the germs are sucked deeper; not so in using holocain. When the surgeon of to-day has cut his finger with a knife passed through tissue of doubtful purity, he no longer burns that wound out, but makes it bleed. Holocain can be combined with topical remedies, but I would not countenance the popular combination of cocain with astringents.

4th. As to holocain being a strong germicide and an excellent remedy for septic ulcers of the cornea, as advanced by Hasket Derby,¹ I can say that I have seen good results from the combined use of holocain with antiseptics and caustics; holocain alone also has had a good influence, but in my practice not in so large a proportion as Derby states.

I may conclude these remarks with saying that in holocain we have not only an *excellent local anæsthetic*, but also a valuable *therapeutic adjuvant* in combination with other remedies.

¹ See these ARCHIVES, xxviii., p. 45, etc.

THE NERVES OF THE HUMAN LID.¹

BY DR. LUDWIG BACH.

Privatdocent and 1st Assistant.

Translated by Dr. MATTHIAS LANCKTON FOSTER, New York.

(With Plates XII. and XIII. of vol. xxxiii. of Germ. edition.)

I HAVE already published in the *Archiv für Ophthalmologie* vol. xli, Abth. 3, the results I obtained by the use of the Golgi-Cajal osmium bichromate silver method on the eyelids of men and rabbits. I have continued these researches, have obtained confirmation of my conclusions regarding the presence of a peculiar tarsal, interglandular, and conjunctival plexus in human lids, and have further found new conditions which I will here briefly describe.

It was noteworthy in my former article that the margin of the human lid was relatively poor in nerve supply, which is not in accord with practical experience in operations. I hazarded the opinion that a greater nerve supply to the margin of the lid must be present and that my result was probably due to the capriciousness of the Golgi-Cajal method. Continued study brought the confirmation of this opinion, together with a surprise, as I had not expected to find this wonderful, fine arrangement.

For the study of this condition frontal sections are best (see Plate xiii). In such sections we see single strong little stems about in the middle of the thickness of the lid, running more or less perpendicularly to the lid margin, which follow pretty nearly the course of the cilia. The single

¹ From the Laboratory of the University Eye Clinic, Würzburg.

nerve stems are usually two or three cilia apart, but united by lateral outshoots, which form a rich, unusually delicate network, particularly close to the margin of the lid and over its entire breadth. This course of the nerve fibres and formation of network is constant.

From this plexus at the lid margin numerous little twigs extend into the epithelium and end in free points between the cells, while others extend forward and backward from the plexus. Those extending forward go to the cilia and surround the glands of the hair follicles; those extending backward supply the Meibomian glands.

Regarding the provision of nerves in the lids of rabbits I have nothing new to advance, but I am inclined to believe that a greater abundance of nerves may also be present here in the tarsus and conjunctiva than I have as yet been able to demonstrate.

Explanation of the Plates.

Plate XII.—Antero-posterior section through the upper lid of a new-born infant, treated according to Golgi-Cajal (double impregnation).

The representation is true to nature, drawn from several specimens. Vergr. Leitz, Syst. IV., Oc. IV., halb. T.

A.—Excretory duct of a Meibomian gland.

A. L.—Outer margin of lid.

Ƒ. L.—Inner margin of lid.

C.—Cilia.

Gl. M.—Meibomian gland.

M.—Moll's glands.

W.—Waldeyer's glands.

M. cil.—Ciliary muscle.

C. G.—Conjunctival plexus.

Ƒ. G.—Interglandular plexus.

T. G.—Tarsal plexus.

L. G.—Plexus at the margin of the lid.

Plate XIII.—Frontal section through the upper lid of a new-born infant, treated according to Golgi-Cajal (double impregnation).

The representation is true to nature, drawn from two specimens. Object., II. Oc. II. K. T. Seibert.

N.—Little nerve roots, which run in a more or less perpendicular direction in the lid from above downward.

L. R. G.—Plexus at the border of the lid; the ramification and diffusion of the nerve on the margin of the lid.

V. Z.—Connecting filaments between the little nerve trunks approaching the margin of the lid.

C.—Cilia.

Gl. M.—Meibomian glands.

L. R.—Margin of the lid.

A.—Excretory ducts of the Meibomian glands.

THE CORNEAL AND SCLERAL NERVES AS
SHOWN BY GOLGI-CAJAL'S OSMIUM BI-
CHROMATE SILVER METHOD.¹

BY DR. LUDWIG BACH,

Privatdocent and 1st Assistant.

Translated by Dr. MATTHIAS LANCKTON FOSTER, New York.

(*With three Illustrations on Plates XIV. and XV. of vol. xxxviii.
Germ. edition.*)

I.—THE NERVES OF THE CORNEA.

SINCE Cohnheim introduced gold chloride into histological technique for the demonstration of the nerves of the cornea, the previously scanty literature on the subject has grown considerably. Excellent as gold chloride is for the demonstration of the corneal nerves, questions arise which it cannot answer. Thanks to this method, the abundance and arrangement of the nerves in the cornea have been determined; we know that these nerves form plexuses which are found at different depths and are divided into a stomaplexus, a subbasal, an epibasal, and an epithelial plexus.

More lately they have been studied again by Dogiel by means of methyl blue. According to Dogiel from 60 to 80 little nerve trunks enter the cornea, 40 to 50 of which approach the anterior, 20 to 30 the posterior surface. The anterior and posterior little nerve trunks divide dichotomously and the separate branches form in the tissue of the cornea a large-meshed plexus. The division of the anterior

¹ From the Laboratory of the University Eye Clinic, Würzburg.

trunks occurs earlier than that of the posterior, the places of division are occupied by round and oval nuclei and by interlacing fibres and fibrils entering into the little nerve trunks. In the formation of the principal plexus the peripheral part, close to the border of the cornea, is made from the twigs of the anterior branches of the little nerve trunks, while the central part is made almost exclusively from the twigs belonging to the posterior little nerve trunks. From the principal plexus more or less thin twigs penetrate Bowman's membrane and form a subepithelial plexus. In the peripheral part of the cornea these fibres arise from the anterior, in the central part from the posterior, little nerve trunks. Almost every corneal layer contains a nerve plexus, united each to each, except in the most posterior, next to the membrane of Descemet, where there is none. These plexuses appear to be equally developed in the peripheral as in the central part, so that their loops have a characteristic rounded form. We are also indebted to Dogiel for a careful study of the endings, as well as of the arrangement, of the nerves in the cornea.

Our knowledge in regard to the subject is then very great, and the chief object of this paper is not to advance a new idea, but furnish a plate which shows a distinct superiority over the delineations of the nerves of the cornea hitherto presented. I have treated the cornea of a new-born infant wholly according to this method, and have obtained so beautiful and, especially for the osmium bichromate silver method, so perfect an impregnation of the nerves that I have thought it worth while to publish the drawing.

The drawing, Fig. 1, Plate XIV., is not pieced together from several preparations, but is from one single cornea and is true to nature in its reproduction.

We see thirty more or less marked nerve twigs enter the cornea, divide dichotomously, and spread out in the various layers of the cornea. They do not form a true reticulum, but we see a network of fibres crossing each other many times, irregularly, and showing a characteristic type, gradually growing finer and finer and ending with free extremities.

From this drawing one gets the impression that the for-

mation of network was less in the periphery than in the central portion. In other incompletely impregnated human corneæ I have seen a more strongly marked network in the periphery.

Such a network in a higher degree, partly a true reticulum, is present in rabbits (see Plate XIV., Fig. 2) and mice.

A detailed description is unnecessary because the delineation, which is true to nature, suffices to quickly set forth the relative conditions.

II.—THE CILIARY NERVES, PARTICULARLY THE NERVES OF THE SCLERA.

In contrast to the foregoing, the researches in regard to the nerves of the sclera are very scanty, and their results slight. In the text-books this subject is usually dismissed with a few words, in some the only nerves mentioned are those which penetrate the sclera, together with the ciliary vessels, to reach the uvea. Even in the work of Graefe-Saemisch we do not find much more.

Helfreich was the only one who, some time ago, described accurately, though from only a few specimens prepared with gold chloride, the many-branched, terminal nerve plexus of the sclera. According to his statement these fine nerves, which he considered to be the scleral nerves proper, are derived in frogs from four or five little trunks, which pass to the globe in the lateral part of the connective-tissue sheath above the optic nerve. The principal nerve trunk belonging to these was not found. In the neighborhood of the entrance of the optic nerve these little trunks form a sort of circular interlacement, and run from there, undergoing repeated dichotomous division, farther forward until they suddenly lose their medulla. These fine transparent fibres form a rich plexus. Free pointed ends well forward in the sclera have also been observed in man by Waldeyer.

Of late attention has been directed anew to the subject, not only to the scleral nerves proper and their endings, but to the ciliary nerves in general. In connection with this subject Boucheron, Peschel, Michel, Retzius, Kölliker, and Axenfeld deserve particular mention.

Of incisive importance to this entire question was the determination of the nature of the ciliary ganglion, which was shown to be a sympathetic ganglion by Michel, Kölliker, Retzius, and d'Erchia. Michel is of the opinion that the nerves coming from the ciliary ganglion only, are made up of sensitive and sympathetic fibres, that, on the contrary, the originating fibres of the ciliary ganglion from the oculomotorius, end therein, while surrounding the ganglion cells.¹ He thinks that the ciliary ganglion is functionally motor, the ends of a number of oculomotor fibres subjoined, that the excitation is received from these and is then communicated as a motor impulse by way of the nerve processes through the ciliary nerves to the sphincter pupillæ and the ciliary muscle. This condition is alleged to explain the strange fact that here two smooth muscles are supplied by a motor nerve.

Considerable study has also been devoted to the course of the ciliary nerves, their points of entrance, their relations to and their course in the sclera. It was long believed that the ciliary nerves were all inserted into the posterior half of the globe, and that only isolated, perforating twigs were found farther forward, described, and their utility estimated. It is not yet certain whether these form a constant condition or only accidental varieties. This has been critically considered by Axenfeld, who from his own researches emphasizes the existence of episcleral, and the presence of remarkable anteriorly perforating twigs. My own experience in regard to the ciliary nerves rests mainly on occasional results which are in a certain measure due to unsuccessful impregnations of the retina.

The delineation of the nerves is almost always obtained by the Golgi-Cajal method but only rarely could I find nerve fibres in the sclera by Weigert's method.

In the majority of cases the eyes were freshly taken from rabbits, occasionally from human fœtuses and new-born children.

¹ Investigation has convinced me of the truth of this hypothesis. If one removes the iris and ciliary body, changes occur in the ganglion cells of the ciliary ganglion, but not in the region of the oculomotor nucleus.

The accompanying drawing, Plate XV., was made from preparations of the sclera of rabbits, but I am inclined to think that the conditions do not materially differ from those in human sclera. From the drawing it appears that in the most widely different places in the section of the globe, both before and behind the equator, nerves of various sizes enter the sclera, which in part branch out to form a network, in part pierce through the sclera and reach the uvea. The scleral nerves take very variable courses. We see fibres which run in the sclera for long distances, others which pierce the sclera directly, and others which send branches both backward and forward from the little nerve twigs. Striking also are the relatively strong little twigs anteriorly in the region of the ciliary body, a region abundantly supplied with nerves, a fact every ophthalmologist can verify by his practical experience. I have the impression from my preparations that the sclera is not so poorly supplied with nerves as it has hitherto been considered to be.

It has occurred to me that the tolerably strong relations of the nerves correspond to the by no means scanty scleral vessels, a condition which appears to indicate that we have to do with rather numerous sympathetic nerve fibres in the sclera.

A practical observation to be derived from the tracing of several prepared specimens is that it is very difficult to reach all the ciliary nerves in an optico-ciliary neurectomy.

I am aware of the incompleteness of what I present, but I think I am able to see, even in this very scanty material, an advance in the investigation of the ciliary nerves, particularly those of the sclera.

Explanation of the Plates.

Fig. 1, Plate XIV.—The surface of the cornea of a new-born child, enlarged. Treated according to Golgi-Cajal. The drawing is made true to nature from one specimen. The margin of the cornea is distinct; one sees the entering little nerve trunks, which divide dichotomously.

Fig. 2, Plate XIV.—The drawing is made from the cornea of a newly born rabbit, which has been treated according to Golgi-

Cajal. The corneal margin dotted. It embraces a quadrant of the cornea, and we see entering little nerve twigs, which form a delicate plexus in the various layers of the cornea.

Plate XV.—This drawing is made from a combination of several specimens. It presents the little nerve trunks entering and ramifying in the sclera of a rabbit. Anteriorly the ciliary bodies, posteriorly the optic nerve, are plainly marked. The section extends from the margin of the cornea to the region of the optic nerve. Some of the incisions near the bottom were made obliquely. By the drawing it is made plain where the scleral nerves can enter, as we see them pass by, branch, and end. The specimen was from a rabbit just born at full term and was treated according to Golgi-Cajal (double impregnation).

DESCRIPTION OF A PORTABLE ELECTRO-MAGNET, AN ORIGINAL DEVICE, TO BE USED IN CONNECTION WITH ANY INCANDESCENT ELECTRIC-LIGHT CURRENT, FOR THE REMOVAL OF PIECES OF STEEL FROM THE INTERIOR OF THE EYEBALL.

By DR. WALTER B. JOHNSON, PATERSON, N. J.

(With four figures in the text.)

AT the January (1899) meeting of the Section on Ophthalmology and Otology of the New York Academy of Medicine, the report of a case of removal of steel from the eyeball served to introduce the new portable electro-magnet used in the operation. The magnet was then in a comparatively incomplete stage of development, although its action was satisfactory. Since the preliminary presentation, important alterations have been made, and it is now pre-

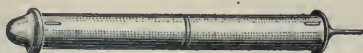


FIG. 1.

sented in complete form and the method of its construction fully described in detail. The core of the magnet is made of the finest grade of Swedish iron which is reannealed and is susceptible of the highest possible degree of magnetic saturation. Its general shape is shown in Fig. 1; its length over all is seven and one half inches; its length within the shoulders for the tips is five and seven eighths inches, and its diameter five eighths and one sixteenth of an inch; its weight

is eleven ounces. One of the tips or ends is made ovoid in form and extends one half inch beyond the shoulder, which is to rest on the limiting fibre washer of the spool; the other end is an elongated tip one and one eighths inches in length from the shoulder, which may be used in the interior of the eyeball if necessary; the tips may be made of any desired shape, length, or thickness. The magnetic energy, however, decreases with the weight of metal



FIG. 2.

and the distance from the shoulder, which is the point of complete magnetic saturation. The core is made in two halves: the one half to telescope; the other, to insure magnetic union when placed within the spool, as shown in Fig. 2. Each half of the core is fitted with a key to lock it in its proper position in the brass tube of the spool, which is slotted for the purpose; when the magnet is energized the core is firmly locked in every position. It is made in this manner for two reasons: primarily to permit its removal from the tube for sterilization, and also to allow the insertion of a new core in case it should become unduly



FIG. 3.

heated during an operation. The spool: in the construction of the spool for the magnet a tube of brass six inches long and three quarter inch outside diameter is fitted with three fibre washers—one in the centre and one on each end, as shown in Fig. 3. The end washers limit the winding; the middle washer is so placed to permit anchorage of the lamp-cord leads to the centre of the magnet so that they will not be in the way of the operator.

The winding: the magnet is wound with two pounds ten ounces of No. 27 single silk-covered magnet wire; the number of turns of the wire on the magnet is ten thousand, which gives five thousand three hundred and fifty-five ampere turns at one hundred and ten volts. One half of the magnet is first wound, when the spool is reversed in the lathe so as to continue the winding of the other half in such a manner that the two halves may be coupled in simple series by joining the two bottom wires. This also brings the terminals of the winding of each half of the magnet to the top layer, where they may be joined with the lamp-cord leads which are firmly anchored to the centre washer of the spool,

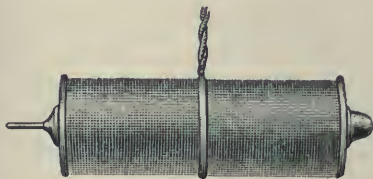


FIG. 4.—JOHNSON MAGNET.

as shown in Fig. 3. The coupling of the two halves of the magnet winding in simple series being thus completed, the resistance is two hundred and five ohms.

The conduction cord, the lamp-cord leads attached to the centre washer, is a ten-foot length of ordinary incandescent-lamp wire, and to the opposite end of this wire is joined the ordinary Edison plug which can be used in connection with the lamp socket of any direct incandescent Edison electric-light current. The Edison plug, by the application of an adapter, can be changed for use in connection with any Thompson-Houston lamp socket, or by adjusting the Westinghouse attachment plug it may be used in connection with any Westinghouse lamp socket; it is therefore applicable for use at any place in which a one hundred and ten or one hundred and twenty volt current for direct incandescent electric lighting may be found; it cannot be used in connection with the alternating current. The complete magnet, as shown in Fig. 4, is seven and one half inches long from tip to tip. One tip is one half inch in

length and ovoid in form ; the other tip is one and one eighth inches in length and elongated, its diameter being three thirty-seconds of an inch ; the length of the spool, including the washers, is five and seven eighths inches ; the diameter of the winding is two inches, the diameter of the washers two and one eighth inches, the weight of the iron core is eleven ounces, and the total weight of the magnet is three pounds and seven ounces ; the winding wire is covered between the washers with thin leather.

The advantages over other magnets used for similar purposes are : Its portability, which permits its application at any desired angle as related to the position of the foreign body in the eyeball, and its use with the patient on the back or in any other desired position. Its adaptability for use in any place where a direct incandescent electric-light current may be found. Its applicability to use for traction by external application or for the introduction of the tip for direct approximation within the eyeball. Its strength—the ovoid tip of the magnet has magnetic energy in apposition with the end of a spring scale equal to a pulling strength of six pounds, and the elongated tip for use in the interior of the eye has a pulling strength of nearly one pound, so that it possesses strength slightly in excess of that of any of the other various forms of magnet previously introduced for like purposes. It can be furnished complete for about fifteen dollars, which will undoubtedly prove an important factor in its probable adoption for general use.

The sample magnets were made by J. H. Bunnell & Co., of 76 Cortlandt Street, New York City.

REPORT OF THE SECTION OF OPHTHALMOLOGY
AND OTOTOLOGY OF THE NEW YORK
ACADEMY OF MEDICINE.

By Dr. J. HERBERT CLAIBORNE, Secretary.

MEETING OF MARCH 20, 1899, THE PRESIDENT, DR. PETER A.
CALLAN, IN THE CHAIR.

Dr. HERMAN KNAPP presented a case of **traumatic cataract and iris cyst**. A young man received an irregular wound of the cornea, upwards and inwards, about four months before, which caused traumatic cataract. Two weeks ago an iris cyst was observed upwards and inwards, springing from the sinus of the anterior chamber; the cyst was transparent. Dr. Knapp referred to the opinion of Eversbusch that *iris cysts are due to an inversion of the ligamentum pectinatum*. He entertained the same views, and the case presented was a striking illustration of the theory. In removing these cysts, he uses a sharp spoon and removes as much tissue as possible from the iris-angle.

Dr. C. H. MAY exhibited a case in which he had made a **Thiersch graft** for the purpose of **restoring a socket that had been obliterated by adhesions after enucleation**. The result was excellent. Later in the evening he read a paper describing the operation in detail (see below).

Dr. E. GRUENING also showed a case in which he had made a Thiersch graft for the relief of symblepharon. The eyeball was firmly and completely attached to the upper lid socket; the eye could not be opened. The symblepharon was dissected away and the Thiersch graft made. He put the graft on a shell, the raw surface being towards the lid; on the tenth day he removed the shell. Two days afterward the graft had to be trimmed. The result was excellent; whereas the eye could not be opened before, it could

now be opened easily, and movements in all directions were unrestricted. Dr. Gruening preferred the Thiersch graft to any other procedure in this class of cases.

Dr. KNAPP said he saw what appeared to be ulcers on the graft. Dr. Gruening said there were none; that the appearance was the normal one of the skin graft.

Dr. T. R. POOLEY said he considered the immediate result in these cases good, but he doubted if the ultimate result would be so good.

Dr. W. M. LESZYNSKY presented a case of **acromegaly, and called particular attention to its ocular symptoms.** A policeman of thirty-six years, who had been in service for eleven years, had been in excellent health up to the time of his marriage nine years ago. Since his marriage he had indulged in venereal excess and had drunk whiskey to excess for many years. He had greatly enlarged hands and feet, lower jaw and lower lip, and occipital protuberance. Both clavicles and the sternum were also enlarged. One year ago he noticed that his vision commenced to be blurred. During the last three months he has been unable to read. Since the first examination, four months ago, the central vision has been reduced to $\frac{20}{40}$ in each eye. There was left *bi-temporal hemianopsia* for form and color, and the remaining portion of the color fields was contracted. In the right eye the field for white was normal, while there was a temporal hemianopsia for red and green; and the remaining portion of the color field was also contracted. The pupils did not react to light but contracted feebly in convergence. The *sense of smell was totally abolished* and the patient suffered much from *somnolence*. Skia-grams of the hands and feet were exhibited; also drawings of the visual fields.

In the *discussion* that followed, Dr. W. A. HOLDEN said that cases of acromegaly were not so uncommon, and that the eye symptoms were well recognized and were due to the enlarged pituitary body pressing upon the chiasm. The commoner type of field in these cases was the *concentrically contracted* one, and the bitemporal hemianopic field though more characteristic was less frequent. The character of the defect in the visual field depends upon the position of the enlargement in the pituitary body.

Dr. Holden called attention to the frequency of glycosuria in acromegaly.

Dr. Leszynsky replied that there was no sugar in the urine

of the patient he had exhibited, and he doubted that it was a constant symptom.

Dr. R. O. BORN presented a patient, a boy whom he saw two weeks before. There were **nodular swelling of the iris in one eye and circumcorneal injection**. There were nodules and blood-vessels in the iris. There was exudate in the pupil and the vitreous humor was cloudy. Though no foci of tuberculosis had been found in other portions of the body, he was confident that it was a case of tubercular iritis. He hoped to be permitted to remove the eye.

Discussion.—Dr. POOLEY agreed in the diagnosis, but said he saw no reason for removing the eye except from a pathological standpoint. Clinically he could not see any advantage in doing so. He had made a careful study of this subject some years ago and he could find no reason in the literature on the subject for removing such eyes.

Dr. GRUENING said he did not agree with Dr. Pooley; he had removed such an eye from an old man on one occasion; six months afterward one of his testicles was removed for tuberculosis. He finally died of an intercurrent affection, and tubercular deposits were found in his lungs.

Dr. Born replied that inasmuch as the eye was blind and painful, he saw no reason why he should not operate.

Dr. W. H. BATES presented a child in which there was a yellowish-white reflex from the fundus of one eye. It had had meningitis six months before. T.—. He had diagnosed cyclitis.

Discussion.—Dr. H. KNAPP said it was a case of metastatic choroiditis after cerebro-spinal meningitis.

Dr. J. A. WIBORN presented a case of **coloboma of the sheath of the optic nerve** in the right eye of a man from the practice of Dr. Webster. The patient had never noticed any defect in the eye although he had been employed on a railroad for twenty years. V $\frac{2}{3}$, w.—1.5 D.

Dr. H. KNAPP was to have read a paper on **the use of the Haab magnet for removing foreign bodies from the interior of the eye**. On account of the late hour he contented himself with briefly stating his views on the utility of a large magnet, and cited cases illustrating its usefulness and its limitations.¹ The first class of cases in which it was useful was that in which the foreign body is in the anterior part of the eye and can

¹ The paper is published in this volume, p. 165.

be seen. Other means are likewise of use in these cases, such as the forceps and scissors. He cited a case in which the Haab magnet had caused a small foreign body to jump through the wound in the limbus corneæ. He laid stress on the necessity of making the power line of the magnet coincident with the line on which the foreign body lies. Sometimes even this would fail, and he cited a case (not from his practice) in which the foreign body slipped into the ciliary region, and could not be extracted.

He referred to another class of cases in which the foreign body cannot be seen, but is obviously within the eye, and the magnet can neither discover nor remove it. When the foreign body is in the anterior part of the eye, the magnet when brought near will often cause the sclera to bulge at the point corresponding to the foreign body. In this respect the magnet is of value as a diagnostic means. When the foreign body is far to the rear, an incision should be made and the Hirschberg magnet introduced into the vitreous humor. He cited several cases illustrating this class. There had been reported thirteen cases of the use of Haab's magnet in this country, and from his own experience and that of others, he felt inclined to accept Haab's dictum that the "strongest magnet is the best magnet."

Discussion.—Dr. F. C. ARD said he had used the Haab magnet in one case with a bad result. A piece of steel had entered through the cornea of a working-man and lodged in the posterior pole of the lens. The magnet point was placed before the lips of the corneal wound and the foreign body was drawn out. The eye, however, became atrophic later and had to be removed.

Dr. PETER A. CALLAN said that when the foreign body was in the vitreous chamber he always made a large incision under the external rectus, and then used the magnet by placing its apex opposite the scleral incision. As a diagnostic means he considered the magnet of Haab unsurpassed. The patients feel a drawing sensation, and there is often a bulging of the eye over the region of the foreign body, when the magnet is applied. He had seen this last phenomenon happen when a piece of iron as small as $\frac{1}{8}$ of a grain was in the eye. He had had a case of foreign body in the posterior pole of the lens, and had observed the lens move backward and forward on the alternate withdrawal and application of the magnet.

Dr. GRUENING had had four cases, and he considered the magnet of value in two ways: first, as a sideroscope, and second,

as an extractor. In the four cases, in which the foreign bodies had been removed through the original wound, he had saved two eyes with good final vision ; the other two had very little vision.

Dr. C. H. MAY read a paper on the **restoration of the conjunctival cul-de-sac by means of Thiersch skin grafts**. He described the method employed in introducing and retaining the shell and the laying on of the graft. Also the after-treatment. The paper was read as an illustration of the case he had presented earlier.¹

Discussion.—Dr. GRUENING said the grafts adhered so firmly to the shell there was no danger of their coming off. There was no necessity of sewing them on and hence no necessity for the apertures in the shell. In fact it was difficult to get them off.

Dr. W. E. LAMBERT had tried a Thiersch graft in a case of complete closure of lids over socket. He first tried inserting a deep lead wire, allowing it to remain for a while, and cutting down on it afterwards. There was no satisfactory result from this ; afterward he used a Thiersch graft, but inserted a lead shell instead of a porcelain one. There was profuse hemorrhage at first ; after two days he put on the graft. There was but little reaction. He hoped for a good result and would exhibit the case later.

¹ Published in this volume, p. 182.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE FOURTH
QUARTER OF THE YEAR 1898.

By DR. ST. BERNHEIMER, in VIENNA ; DR. O. BRECHT,
PROF. R. GREEFF, PROF. C. HORSTMANN, AND PROF.
P. SILEX, in BERLIN ;

WITH THE ASSISTANCE OF

DR. G. ABELSDORFF, Berlin ; DR. SWAN M. BURNETT, Washington ; DR. DALÉN,
Stockholm ; DR. HERRNHEISER, Prague ; Prof. HIRSCHMANN, Char-
koff ; DR. KRAHNSTÖVER, Rome ; DR. P. VON MITTELSTÄDT,
Metz ; Prof. DA GAMA PINTO, Lisbon ; DR. RICH-
ARD SCHWEIGGER, Berlin ; DR. SULZER,
Paris ; DR. L. WERNER, Dublin ;
DR. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

Sections I.-III. Reviewed by PROF. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

476. SELIGMANN. The methods of microscopic examination of
the eye. Berlin, 1899 : S. Karger. (An excellent text-book.)

477. EDGREN. Arterio-sclerosis. Clinical studies. Leipsic,
1898 : Veit & Co.

478. PEUNOFF. A short report of eye operations done on
out-patients in the years 1888-1897. *Wjest. ophth.*, 1898, 4-5.

479. COHN, H. Report on 4000 eye operations. *Wochenschr.
f. Ther. u. Hygiene d. Auges*, II., No. 1.

480. *Transactions of the Ophthalmological Society of the United
Kingdom*, vol. xviii., 1898.

481. SWANZY. On some of the congenital anomalies of the

eye, as illustrated in the *Transactions* of the Society; being an inaugural address. *Trans. Ophth. Soc. Un. K.*, xviii., p. 1.

482. Report of a committee of the Ophthalmological Society to consider the relative value of simple excision of the eyeball, and the operations which have been substituted for it. *Ibid.*, p. 233.

EDGREN (477) presents a comprehensive account of arteriosclerosis, including its relations to diseases of the eye.

PEUNOFF (478) made 4575 operations in all. The number of extractions was 993, with 3 per cent. of losses. Leucomas are tattooed by making a pocket in the opaque tissue by means of the Graefe knife, into which he introduces the India ink with de Weeker's hollow needle.

HIRSCHMANN.

480. The present volume contains 412 pages, occupied by 67 communications, with nine plates and illustrations in the text. Six of the plates are reproductions of skiagraphs of foreign bodies in the eye and orbit. The most important papers are: The Bowman lecture, by Priestley Smith, on the etiology and educative treatment of convergent strabismus; a report of a committee of the Society to consider the relative value of simple excision of the eyeball, and the operations which have been substituted for it; a paper on epithelial xerosis, by Stephenson; retinitis proliferans, with post-mortem examination, by P. Fleming; the pathogenesis of anterior polar cataract by E. T. Collins; several cases illustrating the localization of foreign bodies by the X-rays; experiments on the union of corneal wounds, etc.

L. WERNER.

SWANZY (481) refers to these anomalies under the following headings: Anomalies of motion, colobomata of the iris, microcephalus with proptosis. In the last instance the author completed the examination of the case which was originally described by Power (vol. xiv., p. 212). All the sutures were ossified, with the exception of some of the occipital, hence the brain in its growth uplifted the vault and dragged the orbital plates up, thus obliterating the eye sockets.

WERNER.

482. This important report, which occupies 74 pages, is based on replies from 48 oculists, statistics from various sources, and on three tables of cases, viz.: (1) 120 cases of Mules operation; (2) 20 cases of Mules operation; (3) 40 cases of insertion of artificial globe in Tenon's capsule. Evidence was collected in reference to (1) single excision, (2) evisceration with or with-

out artificial vitreous, (3) insertion of a globe into Tenon's capsule, (4) abscission, (5) optico-ciliary neurotomy, and (6) neurectomy. The questions considered were : I., Relative risks of meningitis and, II., of sympathetic ophthalmia ; III., other disadvantages of each operation ; IV., special advantages with regard to wearing an artificial eye ; V., important points in technique of operations ; VI., to what extent should the choice of operation depend on the nature of the case.

I. In 10,734 cases of excision 7 deaths occurred ; in these the eye was suppurating. But meningitis may arise from suppurating eyes without operation, as proved by cases by Warlomont, Knapp, and Tay. No deaths after the other operations occurred, but the number of cases is not large.

II. Five cases of sympathetic ophthalmitis after Mules operation are recorded, while none was found as a result of simple evisceration. In all the sympathizing eye recovered. Records were also found of sympathetic ophthalmitis after neurotomy and neurectomy. In the 10,734 cases of excision only 2 undoubted cases of sympathetic ophthalmitis occurred in which the interval after operation was more than eight weeks, whereas 5 cases were found after neurotomy and neurectomy with an interval of ten weeks or more. Three cases of sympathetic ophthalmitis after abscission are related.

III. A table of 10 cases of measurements of the orbits in adults having had one eye removed in childhood showed that there was no want of development of the orbit. Enucleation causes defective prominence and motion of artificial eye. Evisceration causes more reaction, prolonging recovery, sometimes sloughing or irritation of stump ; Mules operation in addition, occasional escape of globe, breakage of globe from subsequent injury. This is more a theoretical than a practical objection. Neurotomy and neurectomy have as drawbacks, free hemorrhage into orbit and protrusion of eye, ulceration of cornea, return of pain, papillitis in the other eye. The disadvantages of abscission are hemorrhage, suppuration, irritability of the stump.

IV. All operations are better than excision as regards appearance. With insertion of artificial vitreous position and movements are better, and there is no tendency to accumulation of secretion in socket.

V. In excision the most important points are thorough asep-

sis, and the prevention of the escape of purulent contents of the globe into the socket. In Mules operation these points should be attended to: asepsis, thorough cleansing of scleral cavity, arrest of hemorrhage, the glass globe should fit loosely in the sclerotic, finally accurate opposition of the lips of the scleral wound.

VI. This question is discussed in relation to intraocular malignant growths, suppurative panophthalmitis, wounds likely to cause sympathetic ophthalmia, anterior staphyloma, shrunken eyeballs, and painful blind glaucomatous eyes. A number of very important cases illustrating various points are recorded in this paper, to which is added an appendix containing a separate report by Bickerton, who would confine excision to cases of intraocular growths, extensive wounds of sclerotic, shrunken globes in which uvea cannot be removed, and cases where sympathetic ophthalmia has already begun. In all others he prefers evisceration.

WERNER.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

483. SCHNAUDIGEL. The immigration theory and the doctrine of dormant cells. *Graefe's Archiv*, xlvii., 2, p. 387.

484. WEICHSELBAUM and MÜLLER. On the Koch-Weeks bacillus of acute conjunctivitis. *Ibid.*, 1, p. 108.

485. VAN GEUNS. On the development of cataract after ligation of the venæ vorticosæ. *Ibid.*, 2, p. 249.

486. BÄCK. Experimental histological investigations on contusion of the eyeball. *Ibid.*, 1, p. 82.

487. SCHWARZ. On giant cells about cilia in the eyeball. *Ibid.*, 1, p. 68.

488. KRÜCKMANN. On a case of meningo-encephalocoele of the eyeball. *Ibid.*, 1, p. 50.

489. MONESI, LUIGI. The epithelium in the repair of wounds of the cornea. *Giorn. d. R. Accad. di med. di Torino*, lxi., 8.

490. STRADA. On the goblet cells of the conjunctiva. *Boll. de la Soc. med.-chir. di Pavia*, 1898, No. 3.

491. VAN DUYSE. The pathogenesis of cyclopia. *Arch. d'ophth.*, xviii., 10, p. 623.

492. HIPPEL. On congenital anophthalmus. *Graefe's Archiv*, xlvii., 1, p. 227.

493. PIXENTL. On a pupillary reflex of aural origin. *Atti c. rend. dell' Acc. med.-chir. di Perugia*, ix., 3.

494. HIRSCHBERG. Remarks on magnet operations. *Berliner klin. Wochenschr.*, 1898, No. 46.

According to SCHNAUDIGEL (483) the wandering cells that appear in the cornea after injury, at a time when there is still no reaction on the part of the corneal tissues, contain eosinophilous granules and are therefore leucocytes which have wandered in from the corneal margin. Grawitz's view that the infiltrating cells arise autochthonously from dormant cells and after the inflammation has passed off return to this state, is, therefore, incorrect.

WEICHELBAUM and MÜLLER (484) found the Koch-Weeks bacillus in the secretion of an epidemic of conjunctivitis, the number of bacilli varying with the intensity of the disease. The secretion usually contained other micro-organisms in small number. The bacillus could be cultivated with difficulty on human-blood serum agar-agar, but apparently only when certain saprophytes were grown at the same time. These colonies when inoculated on the healthy conjunctiva produced the disease. The vitality of the bacillus seems to be low and inoculation can take place only when the secretion is fresh. Children are especially susceptible.

VAN GEUNS (485) ligated the venæ vorticosæ in a number of rabbits. The tension became increased at once, blood appeared in the anterior chamber, the lids became œdematous, there was exophthalmus, and the cornea exhibited opacities and new-formed vessels. The cornea again became clear in three weeks. In some eyes total cataract developed; in others partial cataract.

According to BÄCK'S (486) investigations the retina appears normal in cases of commotio retinæ and there are no subchoroidal hemorrhages. The cause of the opacity is a choroidal exudation between the choroid and the retina, the liquid portion of which may be taken up by the retina by imbibition, rendering the retina cloudy. The cause of the exudation is a traumatic paralysis of the vessels.

SCHWARZ (487), in three eyes that had been destroyed by injury, found in the interior of the eye cilia surrounded by granulation tissue in which were giant cells.

MONESI (489), after making a series of experiments, agrees with Ranvier and others that the epithelium which covers corneal wounds is old epithelium from the region about the wound. He

finds, however, in opposition to Ranvier, that there is a zone of actively proliferating epithelium with numerous karyokinetic figures lying in the middle and deeper layers of cells. This proliferating zone lies at a distance from the margins of the wound and is found as early as one hour after the injury, before the lateral migration of the epithelial cells begins. Hence he concludes that the proliferation of cells is not the result of the migration of cells to cover the defect but the active cause of that migration.

KRAHNSTÖVER.

STRADA (490) believes the goblet cells of the conjunctiva to be cells normally and constantly found, whose function is that of forming mucus. This view he bases on a great number of examinations of specimens. The goblet cells originate he believes in the deepest layers of the epithelium.

KRAHNSTÖVER.

VAN DUYSE (491) in the continuation of his paper describes 4 more cyclopic eyes and gives a *résumé* of the findings in the 13 cases. Case 12 differed from the others in that the cyclopic eye of a rhinocephalic foetal pig was not formed by the junction of the two ocular protons. Here the cyclopia was atypical, one ocular vesicle having been destroyed early or having never been formed.

V. MITTELSTÄDT.

In catheterizing the Eustachian tube PIXENTI (493) observed marked oscillatory movements of the pupil which came on whenever the attempt at catheterization was repeated. The author calls this a reflex action, without offering a more definite explanation.

KRAHNSTÖVER.

III.—INSTRUMENTS AND REMEDIES.

495. BRAUNSTEIN. Protargol in eye diseases. *Wratsch*, 1898, No. 42.

496. ESMANN. On the use of protargol as a prophylactic against blennorrhœa neonatorum. *Bibl. for lager*, 1898, No. 49.

497. DISSLER. Protargol in eye diseases. *Wratsch*, 1898, No. 49.

498. GUTTMANN. Atropine in ocular practice. *Wochenschr. f. Ther. u. Hyg. d. Auges*, 1898, Nov. 24.

499. EMMERT. Hyoscine (scapolamine) and hyoscyamine. *Corr.-Bl. f. Schweizer Aerzte*, 1898.

500. LUCCIOLA and CIANCIOLO. A new astigmometer. *Giorn. med. d. R. esercito*, xlv., 3.

501. SCHIÖTZ. Dr. Schiötz's prism apparatus, and its use. *Norsk Mag. f. lægevidensk.*, 1898, No. 10.

502. SACHS The sideroscope and the electro-magnet; their use in ophthalmology. *Wiener klin. Wochenschr.*, 1898, No. 43.

BRAUNSTEIN (495) recommends protargol in acute conjunctivitis and in purulent keratitis with hypopyon. In blennorrhœa of the conjunctiva or of the lachrymal sac, the results were less favorable. In trachoma the author obtained no improvement, and in chronic inflammations but little. HIRSCHMANN.

ESMANN (496) undertook a number of experiments in order to determine whether protargol irritates the conjunctiva of the newborn and whether it is as efficacious as silver in preventing blennorrhœa. He concludes that silver is the more valuable prophylactic, although protargol is less irritating and has the advantage of not staining the clothing. DALÉN.

DISSLER (497) finds that protargol must be used in a solution ten times as strong as silver to have the same effect. Whether protargol is superior in any way to silver is not clear.

HIRSCHMANN.

GUTTMANN (498) believes that atropine is indicated for diagnostic purposes in cases of cataract, but therapeutically it is of value in diseases of the iris only, and not of the cornea.

EMMERT (499) uses hyoscine (which is identical with scopolamine) in 1 % solution. Its advantages are the rapidity of its action, intensity of its action, duration and nature of its action on the pupil and accommodation, its harmlessness as respects the conjunctiva, its lack of effect on the heart and brain, and the permanence of its solutions. In its uniformity of action and in other respects, he regards it as the best of the mydriatics.

The astigmometer of LUCCIOLA and CIANCIOLO (500) does not differ particularly from those now in use. It consists of a telescope provided with a disc which rotates, bearing as a mire a white quadrant with diagonal lines. In cases of astigmatism the quadrant becomes distorted into a rhomb and the change in length of the diagonals is read directly from the ocular.

KRAHNSTÖVER.

Sections IV.-VII. Reviewed by DR. ST. BERNHEIMER,
VIENNA.

IV.—ANATOMY.

503. BERNHEIMER. The reflex path of the pupillary reaction, according to anatomical investigations on embryo human brains and experiments on monkeys. *Graefe's Archiv*, xlvii., p. 1.

504. SCHNELLER. Anatomico-physiological investigations on the ocular muscles of the new born. *Ibid.*, p. 178.

BERNHEIMER (503) studied the reflex path of the pupillary reaction in embryo brains, in monkeys' brains by degeneration methods, and by experiments on living animals.

His conclusions are as follows: The partial crossing of the optic-nerve fibres in the chiasm is absolutely proven. The fibres for the pupillary reaction also cross partially in the chiasm. The pupillary fibres run with the other optic-nerve fibres to the external geniculate body, where they form a separate bundle which passes in a curved course into the anterior quadrigeminal body, running beneath the aqueduct and ending at the sphincter nucleus. Each sphincter nucleus receives fibres from each eye, and, furthermore, there is a central communication between the two nuclei. The author's experiments confirm the views of others that the ganglion habenulæ and Gudden's and Darkschewitsch's nuclei have no relation to pupillary reaction.

V.—PHYSIOLOGY.

505. KOSTER. Report on some experiments in regard to erythroptasia. *Geneesk. Tydschrift*, 1899, i., p. 86.

506. GOLOWIN. Investigations on the specific gravity of the aqueous humor. *Wjest. Ophth.*, 1898, No. 6.

507. PILTZ. On attention reflexes of the pupils. *Neurol. Centralbl.*, 1899, No. 1.

508. BEER. Accommodation in animals' eyes. *Wiener klin. Wochenschr.*, 1898, No. 42.

509. SCHULTZ. On the way in which miotics and mydriatics act. *Arch. f. Physiol.*, 1898, 1-2, p. 47.

510. ABELSDORFF. Physiological observations on the eye of the crocodile. *Ibid.*, 1898, 3, p. 155.

511. MINOR, J. L. Learning to see at forty; first with one eye, and later with both. *N. Y. Med. Journ.*, Nov. 5, 1898.

GOŁOWIN (506) found the average specific gravity of the aqueous humor in the rabbit to be 1.0087, in the dog, 1.0086, and in the cat, 1.0088; these figures representing approximately the specific gravity of 1 % salt solution. The aqueous humor that is secreted immediately after evacuation of the anterior chamber is of higher specific gravity. The specific gravity is also increased after the instillation of 5 % salt solution into the conjunctival sac with abrasion of the corneal epithelium. In chronic glaucoma, the specific gravity of the aqueous is not increased, but in acute glaucoma it is.

HIRSCHMANN.

PILTZ'S (507) experiments on attention reflexes showed that the pupils contract more markedly when the attention is called to a light than when a light is merely placed before the person. Also, the pupils dilate more markedly when the attention is called to a dark object in the visual field than when it is indifferently regarded.

According to SCHULTZ (509), atropine paralyzes the endings of the short ciliary nerves, causing mydriasis. Cocaine dilates the pupil by excitation of the dilatator fibres, and increases the mydriasis caused by atropine. Whether cocaine mydriasis is dependent upon an action on the iris vessels is not absolutely determined. Physostigmine causes miosis by excitation of the peripheral ends of the short ciliaries. Atropine and physostigmine, therefore, are direct antagonists, acting on the same nerves in opposite ways.

ABELSDORFF (510) found the crocodile's retina very rich in cones, as is usual in night-seeing animals. The rods contain visual purple, which is clearly seen with the ophthalmoscope in eyes which have been kept in the dark. The power of regeneration of retinal purple is strong and it does not disappear even after death if the retina remains in contact with the epithelium.

This interesting case of MINOR'S (511) is that of a man of forty who was blind with cataracts from his birth. He was of remarkable intelligence and did most of the things that those with seeing eyes do, such as chop wood, maul rails, split shingles, etc., and could find his way about almost anywhere without difficulty. His instinctive estimate of direction was remarkable. He seemed to be able to tell colors by feeling. One cataract was removed and in ten days the eye was allowed to see. Almost instantly he recognized forms, such as square and round, and had a good judgement as to colors. The visual fields were normal. He

remarked that objects with which he was familiar through touch appeared about one third the size through his eyes. The other lens was successfully removed soon after and he had binocular vision which helped him in estimating distances. V R + 7 $\frac{2}{8}$ — ; L + 7 $\frac{3}{8}$ —. BURNETT.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

512. IWANOFF. The refraction in the first four months of infancy. Inaug. dissert., St. Petersburg. Reviewed in *Wratsch*, 1898, No. 47.

513. WEISS. The visual field of myopes. Leipsic and Vienna: F. Deuticke, 1898.

514. ASHER. Monocular and binocular visual field of a myope. *Graefe's Archiv*, xlvii., p. 318.

515. BARRETT, J. W. Do mammals accommodate? *Ophth. Review*, xvii., p. 255.

516. JACKSON. The distance between the surgeon and patient for accurate skiascopy. *Ophth. Record*, Dec., 1898.

517. RISLEY. Anisometropia. *Ibid*.

518. BRUNS. Removal of lens for high myopia. *Amer. Fourn. of Ophth.*, Oct., 1898.

519. STEBBINS. Two cases of chorea due to eye strain. *Med. Record*, Nov. 9, 1898.

IWANOFF (512) examined 1000 eyes of infants by skiascopy. He found H. in 92 %, E. in 7.2 %, and M. in only 0.6 %. M. of 5.6, and 7 D was found in three infants.

According to WEISS (513), in myopes the field for white and the fields for colors are small.

ASHER (514), who has myopia of 5 D, found that his binocular field of vision was much smaller than the normal.

BARRETT and LANG had previously investigated the refraction of mammals. They never found any alteration in the refractive power of these eyes except in monkeys. Barrett (515) further describes in this paper experiments on animals—monkeys, cats, dogs, etc. A double iridectomy was done in the eye to facilitate observations, and the refraction was determined by retinoscopy before and after the stimulation of the ciliary muscle either by eserine or electricity. No alteration in the refraction was detected except in monkeys. They conclude that the power of accommodation only exists in man and monkeys. The author had a communication

from Dr. Th. Beer, who found that reptiles had an amplitude of accommodation from 13 D to 15 D; monkeys 10 D; in other animals only 1 to 3 D. WERNER.

For the accurate determination of refraction by skiascopy JACKSON (516) recommends a distance of about half a metre, if it is desired to test accurately the refraction of the "visual zone." For this he has always contended. BURNETT.

RISLEY'S (517) experience has demonstrated the wisdom of giving full corrections for each eye in every case, whether in anisometropia of the myopic or hyperopic type, or in antimetropia (one eye H. the other M.; Noyes). BURNETT.

The case reported by BRUNS (518) was a girl of twelve years. R V = $\frac{4}{20}$, with -20 = $\frac{20}{20}$; L, $\frac{5}{20}$, with -18, $\frac{20}{20}$; R lens needled, and fourteen days after two thirds of lens removed by Lippincott syringe, with a slight loss of vitreous. Iritis with hypopyon followed, with closure of pupil. Free iridotomy made which closed. Another was made, giving finally a pupil through which, with +3 +3 105° V = $\frac{20}{20}$. BURNETT.

In the first of STEBBINS'S (519) cases, a girl of nine years, very pronounced choreic symptoms were immediately stopped by +0.75 in R, +0.5 in L. When the glasses were omitted the symptoms returned.

In the second case, a boy of thirteen, there was a small degree of hyperopia with an esophoria of 7°, correction of which by glasses relieved the choreic symptoms completely.

BURNETT.

VII.—MUSCLES AND NERVES.

520. LANDOLT. The strabismus operation. *Arch. d'ophth.*, xviii., 10, p. 609.

521. PRIESTLEY SMITH. On the etiology and educative treatment of convergent strabismus (Bowman lecture). *Trans. Ophth. Soc. Un. K.*, xviii.

522. HANSELL. Pseudo-external strabismus. *Amer. Journ. of Ophth.*, Dec., 1898.

523. BEARD. Recent experience with advancement of the recti muscles. *Journ. Amer. Med. Assoc.*, Oct. 8, 1898.

In a paper before the French Congress of Surgeons, LANDOLT (520) described the development and treatment of strabismus, which has been termed "*pied bot de l'œil*." He expressed his well-known views that tenotomy of the ocular muscles was less to

the purpose than advancement, and that tenotomy, if done at all, should be undertaken only after advancement of the weak muscles had been performed. Orthopædic exercises increase the effect of operation.

V. MITTELSTÄDT.

P. SMITH'S (521) interesting lecture, which occupies thirty pages, deals mainly with the value of the educative treatment of strabismus. The author studied the question himself for two years, and noted all the cases personally. The following points were noted in each case : Age of patient ; age when squint began ; circumstances of onset ; nature of squint, periodic, continuous, alternating, or unilateral ; fixation power of squinting eye ; angle of squint, measured by tape. At the second visit the refraction was estimated under atropine and visual acuteness determined, and glasses prescribed. In later stages the other tests employed were the fusion sense and its limits as determined by a special instrument which is figured, and binocular vision. An analysis of 261 cases of strabismus is given and the author sums up as follows :

1. Convergent strabismus is a disorder of innervation in which the visual centres fail to control the act of convergence.
2. Failure of control depends largely on faulty development of the visual apparatus. The fault, whether it be in the eye or in the central organs, is frequently hereditary.
3. Hypermetropia, when of considerable degree, predisposes to strabismus, and sometimes causes it, by demanding an abnormal effort of control.
4. The disorder is confirmed and perpetuated by suppression of the function of the squinting eye. In treating it we should aim at stopping this habit of suppression and establishing the habit of binocular control.

In 200 cases which were re-examined, 57 had binocular vision of a certain kind ; 59% of the periodic and 18% of the continuous squints had recovered binocular vision. In half of the 200 cases there was no binocular vision restored. These remarks relate to fusion only, and not to full perspective vision, which was recovered only in 16 cases.

Following Javal these methods of education were employed, viz. : occlusion of one eye ; bar-reading ; and the use of fusion tubes.

WERNER.

In HANSELL'S (522) case there was an external strabismus which had been operated upon previously by division of the externus with some correcting effect. H. found by the use of

his cobalt glass test that there was exophoria of some 15° and also hyperphoria of from 4° to 8° . He corrected the hyperphoria by operation and with this there came a slight over-correction of the exotropia without anything being done to the externus.

BURNETT.

BEARD (523) gives statistics of 214 cases of squint, 142 of which were convergent. Of these 81 were treated by advancement, 57 of the externus, 24 of the internus. From a study of these cases he is convinced that advancement is the only proper operation for all forms of strabismus.

BURNETT.

Sections VIII.—XII. Reviewed by PROF. SILEX, Berlin.

VIII.—LIDS.

524. RAEHLMANN. On disease of the lashes and lids due to mites in the hair follicles (*Blepharitis acarica*). *Deutsche med. Wochenschr.*, 1898, Nos. 50–51.

525. GÜNSBERG. A case of myxœdema of the lids and face unsuccessfully treated with thyroid preparations. *Wjest. Ophth.*, 1898, Nos. 4, 5.

526. ISCHREYT. A presumable case of congenital trichiasis. *Centralbl. f. pract. Augenheilk.*, xxii., p. 371.

527. QUERENGHI. On the treatment of entropium and trichiasis by horizontal linear cauterization of the lids. *Ann. d'ocul.*, cxx., p. 241.

528. PESCHEL. A new modification of the trichiasis operation. *Zehender's klin. Monatsbl.*, xxxvi., p. 426.

529. VEHMEYER. On the etiology of ectropium. *Wochenschr. f. Ther. u. Hyg. d. Auges*, ii., No. 2.

530. ADAMUECK. A few words on the so-called Jaesche-Arlt operation. *Wjest. Ophth.*, 1898, Nos. 4, 5.

531. MOTAIS. The ptosis operation. *Ann. d'ocul.*, cxx., p. 378.

532. HIRSCHBERG. The operative elevation of the upper lid after shot wounds of the temple. *Deutsche med. Wochenschr.*, 1898, No. 39.

RAEHLMAN (524) finds the demodex folliculorum, which Stieda accidentally discovered in the follicles of the eyelashes in a corpse, to be present in the lids with some frequency. The female is about $400\ \mu$ and the male $220\ \mu$ long. From the eggs

six-footed larvæ develop. The mites are found in the hair follicles only and not in the sebaceous glands. They lie deep, between the lash and the root sheath. The parasite is found in 2 per cent. of healthy eyes and in 25 per cent. of trachomatous eyes, but is absent in the usual forms of blepharitis. The use of a salve composed of balsam of Peru and lanolin brings about a cure in six or eight days.

ISCHREYT'S (526) patient, a girl of 12, suffered from trichiasis which, according to the mother's statement, was congenital.

QUERENGHI (527) believes that in the treatment of entropium and trichiasis linear cauterization is not used frequently enough, although the good results following its employment were shown long ago by Cusco and Magni.

The cauterization is performed with a thermo- or galvanocautery in a line parallel to the lid margin and 4 mm from it.

SULZER.

ADAMUECK (530) calls attention to the fact that Arlt's method of operation had nothing in common with Jaesche's, but that it was a completion of Flarer's operation, Flarer's bridge of skin being transplanted instead of being removed. Arlt called the modified operation the Jaesche-Arlt, possibly because he misunderstood Barth's description, the original paper being published in Russian.

HIRSCHBERG (532) obtained good results with the Birnbacher operation in 5 cases of traumatic ptosis. The sutures should remain in three weeks.

IX.—LACHRYMAL AFFECTIONS.

533. AHLSTRÖM. On traumatic dislocation of the lachrymal gland. *Centralbl. f. p. Augenheilk.*, xxii, p. 300.

534. RISLEY. The conservative treatment of epiphora and affections of the lachrymal apparatus. *Journ. Amer. Med. Assoc.*, Oct. 1, 1898.

535. REIK. The value of large probes in the treatment of lachrymal strictures. *Ibid.*, Oct. 8, 1898.

536. BLACK. The use of large probes in stenosis of the lachrymal duct. *Ibid.*

AHLSTRÖM (533) adds a fifth to the four previously reported cases of dislocation of the lachrymal gland. The patient was

a child of twelve who in his second year had fallen on the ice, injuring the right upper lid. When examined there was well marked ptosis, caused by thickening of the upper lid, particularly near the outer canthus. A tumor was found under the skin which, on removal, proved to be the lachrymal gland in a state of chronic interstitial inflammation. The fact that all the cases of dislocation on record occurred in infancy leads the author to believe that there is then a less firm fixation of the gland than later.

RISLEY (534) pleads for a more conservative and delicate treatment of lachrymal affections. The punctum alone is often at fault in epiphora, and he has found, in some cases, an obstruction at the nasal end of the duct, the removal of which gave relief. The use of probes should be carefully made and large ones are seldom necessary.

BURNETT.

In 130 cases of lachrymal stricture treated with probes ranging from No. 12 to No. 16, REIK (535) has found that about 95 % were cured ; a relapse may occur in about 5 % of these.

BURNETT.

The three points BLACK (536) desires to emphasize in this paper are the opening of the upper canaliculus, the use of the largest probes possible, and the electrolytic action of the negative pole of the battery.

BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

537. MAYER. Intermittent exophthalmus with blindness and partial paralysis of the extrinsic ocular muscles. *Zehender's klin. Monatsbl.*, xxxvi., p. 435.

538. PURTSCHER. On traumatic enophthalmus. *Arch. f. Augenheilk.*, xxxviii., 2, p. 144.

539. GOLOVINE. A plastic procedure for closing the orbit after exenteration. *Arch. d'opht.*, xviii., p. 679.

540. AHLSTRÖM. Two cases of ectasia of the ethmoid cells simulating orbital tumor. *Zehender's klin. Monatsbl.*, xxxvi., p. 375.

541. ROOSA. A case of dislocation of the eyeball produced by the fall of the branches of a decayed tree upon the face and head. Complete recovery of the injured ball. *The Post-Graduate*, Nov., 1898.

542. GOODE. A case of sarcoma of the orbit. *Amer. Journ. of Ophth.*, Dec., 1898.

MAYER'S (537) patient was a woman of thirty-seven, whose intermittent exophthalmus was supposed to be due to varicose orbital veins.

PURTSCHER (538) reports two cases of traumatic enophthalmus. One patient was struck by the horn of a cow in the region of the left eye, and the other was kicked in the forehead.

Since it was unlikely that there were cicatricial contractions in the orbit, and deformity of the orbital walls was wanting, and the normal pupil spoke against injury of the sympathetic, the author assumed in one case a trophic disturbance of the orbital tissues from injury of the nerves. In the second case there may have been fracture of the orbit.

In order to hasten the healing, prevent indrawing of the lids, and allow an artificial eye to be worn, GOLOVINE (539) implanted a skin flap in an orbit from which he had removed a sarcoma.

When granulations began to form on the bone a flap from the temple was turned in upon the outer wall of the orbit and a second flap pushed in from below and outward. After a time the pedicle of the latter flap was divided at the orbital margin. The orbit when covered with epidermis was greater than the cavity following an enucleation, but it was so similar to the latter that an artificial eye could be worn.

v. MITTELSTÄDT.

In the case reported by ROOSA (541), a piece of wood coming from above, passed through the upper lid across the cornea and penetrating the floor of the orbit entered the antrum and came out in the mouth. There was much inflammation of the cornea and conjunctiva and many months of treatment with an operation on the bones of the face were necessary before the patient recovered, but this he did, with no further damage to the eye than a paralysis of the inferior rectus.

BURNETT.

GOODE'S (542) case was that of a girl of eleven years, who had a small growth at the lower outer part of the left orbit not involving the eye. It was removed in May. In June there was a reappearance, and the tumor and eyeball were removed. In September there was another return, for which operative procedure was declined. Alt, who examined the growth, calls it an alveolar large round-celled sarcoma.

BURNETT.

XI.—CONJUNCTIVA.

543. SCHMIDT-RIMPLER. Some remarks on trachoma and epidemic eye diseases and on their treatment. *Deutsche med. Wochenschr.*, 1898, No. 47.

544. HOPPE. The treatment of epidemic trachoma. *Wiener med. Wochenschr.*, 1898, No. 46.

545. HOPPE. Trachoma epidemics and their control in Gumbinnen. *Klin. Fahrh.*, vii., 1.

546. GÜNSBERG. On the treatment of trachomatous entropium and trichiasis. *Wjest. Ophth.*, 1898, Nos. 4, 5.

547. SAUER. On blennorrhœa neonatorum. *Inaug. Dissert.*, Bonn, 1898.

548. AXENFELD. On non-gonorrhœal blennorrhœa of the conjunctiva. *Deutsche med. Wochenschr.*, 1898, No. 44.

549. TAMAMCHEF. Conjunctivitis diphtheritica seu necrotica. Ocular diphtheria treated with iodoform. *Centralbl. f. Augenheilk.*, xii., pp. 321 and 362.

550. MICHEL. A contribution to the bacteriological study of phlyctenular ophthalmia. *Ann. d'ocul.*, cxx., p. 257.

551. VIGNES. Soft chancre of the bulbar conjunctiva. *Ann. d'ocul.*, cxx., p. 284.

552. SPIRO. A case of conjunctival hemorrhage in purpura hemorrhagica. *Centralbl. f. p. Augenheilk.*, xii., p. 375.

553. SOURDILLE. Congenital serous cyst (cystic lymphangioma) of the bulbar conjunctiva. *Arch. d'opht.*, xviii., 11, p. 673.

554. STEPHENSON, SYDNEY. On epithelial xerosis of the conjunctiva. *Trans. Ophth. Soc. United Kingdom*, xvii., p. 55.

555. HOTZ. On the use of epithelial grafts for replacing the ocular conjunctiva. *Four. Amer. Med. Assoc.*, Oct. 1, 1898.

556. GILFILLAN. The prevention and treatment of trachoma at the House of Refuge. *N. Y. Med. Four.*, Oct. 29, 1898.

SCHMIDT-RIMPLER (543) calls attention to the insufficient inspection of candidates for military service who suffer from eye diseases. He has used the Scott method of treating pannus, as it is employed in Cairo, with success. In Egypt he found about 80 per cent. of trachomatous persons. The infection seems to be carried by flies. In Cairo and in Constantinople he found usually only cicatricial trachoma.

HOPPE (544) recommends the establishment of dispensaries as well as hospitals in regions in which trachoma is prevalent. He uses Knapp's roller forceps.

The purposes of a satisfactory entropion-trichiasis operation are to remove the curvature of the tarsus, to supply a new intermarginal space when possible, to weaken the orbicularis, and to fix the skin of the lid so that it cannot glide over the anterior surface of the tarsus. GÜNSBERG (546) believes that the simplified operation of Panas meets these demands.

It is performed as follows : Knapp's lid clamp is applied, an incision is made 4 mm from the lid margin and parallel to it, a section of muscle 2-3 mm broad is removed and the tarsus exposed ; the latter with the conjunctiva is then cut through. Sutures with two needles are then introduced, 3 mm apart, into the skin of the upper margin of the wound, then deep into the cartilage and out at the upper margin of the tarsal wound, then into the lower portion of the tarsus 1-1½ mm below the cut edge, passing through its entire thickness and emerging on the mucous side, where they are tied.

HIRSCHMANN.

AXENFELD (548) reminds his readers that there are various forms of gonorrhœa of the conjunctiva with and without gonococci. Gram's stain is necessary to distinguish true gonococci from pseudo-gonococci and possibly from pneumococci. In two cases Axenfeld found a blennorrhœa to be due to bacteria of the group bacterium coli commune, and in one new-born infant a double diphtheria of the conjunctiva was due to virulent Loeffler bacilli but passed off after antitoxin injections.

Among 10,000 cases of eye disease TAMAMCHEF (549) saw 9 cases of true diphtheria of the conjunctiva. He suggests instead of diphtheritic and croupous the terms conjunctivitis necrotica and fibrinosa ; in the former condition the cornea sloughs rapidly, while in the latter it is not affected. It is not fully decided whether the Loeffler bacillus is the sole cause of the necrotic form. Ordinary methods of treatment are of little avail but the author preserved the cornea in every case by washing out the conjunctival sac with formalin solution, 1-2000 or 1-500, and then sprinkling in finely powdered iodoform and keeping the eye bandaged for twenty-four hours. This procedure was repeated daily for a time.

In a careful investigation concerning the etiology of phlyctenular inflammation MICHEL (550) comes to the following conclu-

sions: 1. Phlyctenular inflammation is of parasitic origin but individual disposition is of importance. 2. The phlyctenula is a reaction sign without specific character; inoculation experiments on rabbits showing that while the staphylococci are the most frequent cause of the disease various other cocci and bacilli may cause it.

SULZER.

VIGNES'S (551) patient, a man of fifty, exhibited symptoms of a severe purulent inflammation of the left eye. No gonococci were found, but on the conjunctiva of the upper lid was a deep purulently infiltrated ulcer. At the time, the patient was dressing a suppurating bubo which had been caused by a soft chancre. Unfortunately a thorough bacteriological examination was not made.

SULZER.

SPIRO (552) presented a case of conjunctival hemorrhage in purpura hemorrhagica. A child of three, after recovering from an attack of measles thirteen weeks before, began to bleed from the left conjunctiva. When examined, numerous hemorrhages were discovered in other parts of the body. There was complete recovery in a month.

SOURDILLE (553) observed a thin-walled bluish cyst beneath the conjunctiva of a laborer, aged twenty-seven. The cyst, which for a time remained small, grew rapidly for two months, attaining a size of 25 x 12 mm.

The contents of the cyst were clear and after removal the wall was found to be composed of a lining of polygonal cells, a thin fibrous layer, and a connective-tissue layer with vessels which passed over into the normal tissues. The author concluded that this was a congenital lymph cyst of the sort found in the axilla and in the neck.

V. MITTELSTÄDT.

STEPHENSON (554) contributes a very exhaustive and original paper of forty pages on epithelial xerosis as distinguished from the parenchymatous form. He examined 6209 school children and found that 1.87% had xerosis. A very detailed description of the disease is given, but we can only mention the more important or original points. The xerosis patches do not stain with fluoresceine; methylene blue and some other basic aniline dyes stain them a little. The silvery scales are reproduced within twenty-four hours after complete removal. There is no local anæsthesia. In all cases the typical bacilli were found. They were best shown by Gram's process with eosine as counter stain, and have no capsule or flagella. They develop colonies *within sixteen hours* on

serum or blood agar. The microscope alone could not differentiate them from the diphtheria bacillus. Milk is a good nutrient medium, potato not. He sometimes found them in the normal conjunctival sac, and in the white foam which collects on the lids in some cases of conjunctivitis. Attempts to inoculate the conjunctiva failed as with previous writers. The author asks if they might not succeed in individuals after wasting illnesses. The next question discussed is the relation between xerosis and hemeralopia; Stephenson found the proportion to vary at different times and places, but their connection is very close.

In cases of epithelial xerosis without night blindness the author found a shrinking of the field for red and green, the red field lying inside or overlapping the green, and less constantly slight contraction of the white field. These disappear with the disappearance of the xerosis. The changes in the visual fields are more marked when hemeralopia is present. Ophthalmoscopically the only point noticed was exaggeration of the retinal reflexes. The views of previous writers as to the cause of this disease are next considered and may be reduced to two, namely: first, lowered nutrition; and second, dazzling. The author has only met with the disease in spring and summer when the glare on the white-washed walls and flagged yards in the schools was at its greatest, but of the two factors he considers lowered nutrition the more important. In a majority of the author's patients there was evidence of scrofula, and an investigation of the blood showed a marked deficiency of hæmoglobin (65% of the normal) in every case, which diminished with the disappearance of the xerosis. Iron sometimes exerts an almost specific influence upon the disease; cod liver oil is not a speedy remedy. The paper concludes with sixty-seven references to previous literature and a table showing results of estimation of hæmoglobin in 164 *healthy* children.

In the course of the subsequent discussion Dr. Eyre stated that he had made inoculations of the xerosis bacillus in animals whose resistance had been lowered by the previous injection of toxins, but had never had positive results.

L. WERNER.

HOTZ (555) reports a case in which he used epithelial grafts from the lips, cut after the manner recommended by Gifford, to replace the conjunctiva after the removal of an epithelioma of that tissue. The size of the graft used was 1.5 cm by 0.5 cm. He

used a suture above and below. The graft was found firmly adhered at the end of the second day.

BURNETT.

Out of a total of 800 inmates of the House of Refuge, GILFILLAN (556) found 325 affected with trachoma. The further spread of the disease was prevented by thorough isolation. In the early stages he uses expression, followed generally with sulphate of copper crystal. In the chronic forms he has found the copper crystal most efficacious.

BURNETT.

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

557. V. HIPPEL. The anatomical findings in purulent keratitis in man. *Graefe's Archiv*, xlvii., p. 156.

558. LESSHAFT. On the treatment of ulcer serpens corneæ. *Zehender's klin. Monatsbl.*, xxxvi., p. 358.

559. SASSAPAREL. The treatment of chronic keratitis and conjunctivitis by massage with an ointment containing bichloride of mercury and cocaine.

560. SAEMISCH. A case of scabies of the cornea. *Zehender's klin. Monatsbl.*, xxxvi., p. 449.

561. PESCHEL. A case of epithelioma of the corneal limbus removed with recurrence after thirteen years. *Ibid.*, p. 368.

562. PROKOPENKO. A movable foreign body in the anterior chamber. *Wjest. Opth.*, 1898, 4, 5.

563. BAUMANN. On keratoconus. *Inaug. Dissert.*, Erlangen, 1898.

564. GRADLE. Traumatic recurrent keratitis, keratalgia, and ciliary neuroses. *Annals of Opth.*, Oct., 1898.

565. KINNEY. A case of severe ulcerative keratitis successfully treated with nosophen after other remedies had failed. *The Post-Graduate*, Nov., 1898.

566. COX. Papilloma of the corneo-scleral margin with report of a case. *Ibid.*

V. HIPPEL (557) reports on a bilateral kerato-malacia with pneumococci, in an infant with hereditary syphilis, and on the anatomical findings in neuroparalytic keratitis. In the latter case there was a true hypopyon keratitis, whose origin was doubtless due to micro-organisms. The beginning of the process seemed to him to be the dessication, the inoculation occurring later.

LESSHAFT (558), in serpent ulcer, whether there is evident dacryocystitis or not, treats the lachrymal sac by passing probes and by irrigating. The cornea is first subjected to a conservative antiseptic treatment, and if this is not successful the galvanocautery is used or Saemisch's operation is employed. He attaches great value to warm, moist, iodoform-bichloride dressings.

SASSAPAREL (559) recommends a salve consisting of 1-500 bichloride solution, one drop; cocaine, 0.10; and vaselin, 4.00; for massaging phlyctenular processes of the cornea and conjunctiva and chronic conjunctival catarrhs. KRAHNSTÖVER.

In SAEMISCH'S (560) case there appeared to be an ordinary fascicular keratitis. After using red precipitate ointment the eye became much irritated and a grayish-white mass appeared at the seat of the infiltration. When examined with the microscope a well-preserved female acarus scabiei was found with eight eggs near it.

PROKOPENKO'S (562) patient had a movable body that seemed to be a chip of coal, in the anterior chamber. The eye being free from irritation no operative treatment was undertaken.

HIRSCHMANN.

BAUMANN (563) reports a case of keratoconus with threatened perforation. After being cauterized three times the cornea resumed its natural curvature, and there remained a dense sharply-outlined scar 3 mm in diameter.

GRADLE (564) has observed a number of cases of recurrent corneal affections following slight injuries to the corneal surface. He has never seen them follow deep wounds. The first of these classes is the persistence of a grayish opacity which was associated with periodic and easily induced attacks of ciliary injection. He has seen them last for two years and then finally disappear, showing that they were not scar tissue. In another class of cases the lighting up is in the form of a genuine keratitis. These may occur from months to years after the original injury. In the treatment of these cases he has found antipyrine the best analgesic, and calomel locally to exercise a good influence. In obstinate cases the actual cautery has promptly cured them.

In still another different form there are pain and ciliary injection without visible corneal lesion, beginning sometimes long subsequent to the original injury. One case he gives in great detail in which it recurred at intervals of from one week to five for thirteen years. In those cases of keratalgia he is inclined to

assume some injury to the terminal filament of the nerve as a cause.

BURNETT.

In the case reported by KINNEY (565) a very extensive creeping ulcer of the cornea with hypopyon, which had resisted all forms of medication, began to improve at once on the local application of nosophen. He has found the drug useful in other cases of less virulence.

BURNETT.

Cox's (566) patient was a man of fifty. There was a soft, pinkish, elastic tumor with mammillated surface, at the lower corneo-scleral margin extending up to the edge of the pupil. It was 1 cm in diameter. It was removed twice and recurred in a short time on each occasion. The third time the base was thoroughly scraped and nitric acid applied. It did not return. The microscope showed a papillomatous structure.

BURNETT.

Sections XIII.—XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

567. SCHMIDT-RIMPLER. On spontaneous resorption of opacities of the lens. *Berl. klin. Wochenschr.*, 1898, No. 44.

568. MADER. Further contributions to the final result of reclination. *Wiener klin. Wochenschr.*, 1898, No. 50.

569. PLEY, EUGENE. On a procedure for the extraction of secondary cataract. *Thèse de Paris*, 1898.

570. BURNETT. On some changes in visual sensations after cataract extraction, and especially blue vision (kyanopsia). *Ophth. Record*, 1898, vii., p. 17.

571. VALK. Cataract extraction, Valk's operation. *Ibid.*, p. 289.

572. BATTEN. Symmetrical congenital lenticular opacities. *Trans. Ophth. Soc. Un. King.*, xviii., p. 105.

573. BICKERTON. Congenital displacement of lenses, spontaneous dislocation into the anterior chamber, replacement into the vitreous by operation, recovery of perfect vision. *Ibid.*, p. 118.

574. PECK. Traumatic cataract in an infant's eye from pressure of the forceps. *Med. News*, Nov. 26, 1898.

575. MITCHELL, S. Fragment of steel in the crystalline lens. *Ophth. Record*, Nov., 1898.

SCHMIDT-RIMPLER (567) reports two cases of spontaneous absorption of senile cataract, and adds some remarks on the clearing up of senile, diabetic, and traumatic opacities of the lens, and concludes with a description of experiments on rabbits' eyes in regard to cataract, new formation of the lens, and corneal opacity.

MADER (568) collected reports of thirty-nine eyes in which re-clination had been done. Most of the eyes were blind, and those that still retained useful vision presented symptoms which suggested a final disastrous outcome.

In the case reported by PECK (574), the right eye of an infant was pressed upon by forceps during delivery, causing a severe traumatism, a decrease of tension, and a traumatic cataract. The cataract was absorbed, and at the age of seven years and a half vision in the eye was $\frac{2}{8}$ and with + 1. D $\frac{2}{8}$. There was a slight divergent strabismus.

BURNETT.

MITCHELL (575) reports two cases of bits of steel in the lens, which had entered the eye through the cornea and pupil, leaving the iris intact. Both were successfully removed by the magnet having a lifting power of one ounce. One was 7 mm, the other 3 mm long. Both eyes recovered nicely.

BURNETT.

XIV—IRIS.

576. GROENOUW. A case of unpigmented alveolar flat sarcoma of the ciliary body, with remarks on the presence of epithelioid cells in and on the retina in glaucoma. *Graefe's Archiv*, xlvii., p. 282.

577. GROENOUW. On sarcoma of the ciliary body and its relations to sarcoma elsewhere in the uveal tract. *Ibid.*, p. 398.

578. ANDREWS. Congenital absence of the iris. *Ophth. Record*, Nov., 1898.

579. ALT. Note on the pigmented globular excrescences of the iris of the horse. *Am. Jour. of Ophth.*, Dec., 1898.

580. ALT. Adenoma of the ciliary body arising from the pars ciliaris retinae. Four cases. *Ibid.*, 1898, p. 321.

GROENOUW's (576) case was one of primary, flat, unpigmented, alveolar sarcoma in a man of twenty-eight. It involved half of the ciliary body and had given rise to two secondary epibulbar tumors of similar structure. There was secondary glaucoma. Above and beneath the limitans interna were polygonal epithe-

lioid cells, some having processes. Groenouw was inclined to believe these cells to be of inflammatory origin and not sarcomatous.

GROENOUW (577) collected fifty cases of sarcoma of the ciliary body from the literature. Ninety per cent. were pigmented, ten per cent. unpigmented. Spindle-celled sarcoma was most frequent, mixed-celled next, and round-celled rarest. The average age of patients with spindle-celled sarcoma was forty-four, of patients with round-celled thirty-five; the latter being of more rapid growth and more malignant. The patients with unpigmented sarcoma were, as a rule, younger than those with pigmented. The prognosis is better in sarcoma of the ciliary body than in sarcoma of the choroid (12 per cent. of cures in the former), probably because it is recognized and operated on earlier.

The two cases of congenital absence of the iris reported by ANDREWS (578) occurred in a mother and infant daughter. In the mother there was also upward dislocation of both lenses, which were more or less opaque. A discission was made on the right lens, which was followed by glaucoma. For this an anterior sclerotomy was done and pilocarpine instilled. She recovered with V = $\frac{1}{8}$ with + 12. A general consideration of irideremia followed.

BURNETT.

ALT (579) examined the pigmented nodule found on the pupillary edge of the iris of the horse. It has a glandular appearance, and, the author thinks, may be similar to the benign adenomata he has described as found on the ciliary processes of the human eye.

BURNETT.

ALT (580) describes and pictures a form of tumor of the ciliary processes which he has found in four eyes. Of three of these eyes he had no previous history. The fourth was enucleated for sarcoma of the conjunctiva. All the tumors had the characteristics of adenoma. Their origin is doubtful.

BURNETT.

XV—CHOROID.

581. ROTHENPIELER. Secondary cyclitis, arising by way of the lymph current. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 304.

582. DELBÉS. A case of death after enucleation for panophthalmitis. *Clin. opht.*, 1898, No. 14.

583. STRZEMINSKI. A case of essential ophthalmomalacia. *Graefe's Archiv*, xlvii., p. 420.

584. MARSHALL. Some points connected with sarcomata of the choroid and gumma of the conjunctiva. *Ophth. Record*, Dec., 1898.

ROTHENPIELER's (581) patient developed a severe cyclitis in the course of an inguinal bubo from a phagadenic soft chancre. Both cyclitis and bubo recurred simultaneously. Eventual recovery.

STRZEMINSKI (583) adds a new case to the seventeen already recorded of essential ophthalmomalacia. In this case he observed four attacks of hypotony all ending in recovery. He believes the cervical sympathetic to be more at fault than the trigeminus in this vasomotor neurosis.

One case of sarcoma of the choroid reported by MARSHALL (584) was found in an old atrophic eye which had been lost from injury thirty-six years before. The first sign of irritation appeared eighteen months before enucleation. A bony degeneration of the choroid was also present nearly filling the globe. The tumor had extended beyond the globe at the optic-nerve entrance. The other case was also in a degenerated eye whose vision had been lost for twenty years.

The case of gumma of the conjunctiva was in an old man whose eye was lost through hemorrhagic retinitis and glaucoma. There was an enormous thickening of the conjunctiva around the cornea and extending some distance back. The eye was removed and the growth found to have a gummatous nature.

BURNETT.

XVI.—VITREOUS.

585. MCGILLIVRAY. The hyaloid artery and its relations to cyclitic exudation. *The Scottish Med. and Surg. Jour.*, Oct., 1898.

MCGILLIVRAY (585) describes and illustrates a case showing that cyclitic exudation may fill the patellary fossa, hyaloid canal, and its expansion at the optic disc, the area Martegiani. It is a pathological demonstration of the patency of the hyaloid canal.

WERNER.

XVII.—GLAUCOMA.

586. TROUSSEAU. Glaucoma and ophthalmic migraine. *Ann. d'ocul.*, cxx., p. 253.

587. ANGELUCCI. Disturbances in the function of the vessels in buphthalmus and the value of surgical procedures. *Ophth. Klinik*, 1898, 3, p. 44.

588. ROGGMANN. Some considerations on operative intervention in the treatment of simple chronic glaucoma. Extract from *La Belgique médicale*.

589. ASCHHEIM. The transfixion of the iris. *Arch. f. Augenh. k.*, xxxvii., p. 117.

590. HARLAN. A case of hereditary glaucoma. *Four. Am. Med. Assoc.*, Oct. 8, 1898.

591. ALT, SHOEMAKER, and JENNINGS. Another case of hemorrhagic glaucoma with a clinical diagnosis of previous thrombosis of the central retinal vein. *Am. Four. of Ophth.*, Oct., 1898.

TROUSSEAU (586) gives the history of a case in which short attacks of glaucoma with subjective light sensations and pain were mistaken for attacks of ophthalmic migraine, since between the attacks the affected eye (one eye having been blind from infancy) was entirely normal. Fortunately the patient was once examined in the course of an attack when the marked increase in tension, the episcleral injection, and the characteristic cloudiness of the media left no doubt as to the diagnosis even though the pupil was normal.

SULZER.

ROGMANN (588) collects all the recent views in regard to the treatment of glaucoma and recommends iridectomy.

ASCHHEIM (589) reports on eighteen eyes in which transfixion of the iris was made. The operation replaces iridectomy in cases of *iris bombé*, being easier to perform and not leaving a coloboma. Since a favorable result was noted in fifteen of the cases the author feels justified in commending the operation.

HARLAN (590) gives the history of a case of glaucoma which is in the fifth successive generation suffering from the same affection. The family is of French Huguenot stock. The case yielded readily to iridectomy.

BURNETT.

The clinical history of this case by SHOEMAKER and JENNINGS (591) shows a case of thrombosis of the central retinal vein of the left eye, followed some weeks later by a secondary hemorrhagic glaucoma for which the eye was enucleated. The microscopical examination was made by ALT. The chief point of interest brought out by this was the wide-spread, almost total peri-arteritis, and a thrombosis of some branches of the central retinal vein

within the retina. The whole vascular system of the eye seemed to be in a pathological state. In a former case examined by him and reported, the vascular change was confined almost wholly to the veins.

BURNETT.

XVIII.—SYMPATHETIC OPHTHALMIA.

592. MOLL. Experimental bacteriological studies on sympathetic ophthalmia. *Centralbl. f. prakt. Augenheilk.*, xxii., p. 353.

593. HANSSEN. On injuries of the ciliary body and their relation to sympathetic ophthalmia. *Inaug. Dissert.*, Kiel, 1898.

In rabbits whose blood was infected with the bacillus pyocyaneus, MOLL (592) was able, after irritating one eye, to cultivate the bacillus from the aqueous humor of both eyes, while in control animals, whose eyes had not been irritated, the aqueous humor remained sterile. The author, therefore, agrees with Schmidt-Rimpler, Bach, and Panas, in believing that irritation of one eye causes a disposition to sympathetic ophthalmia in the second eye, and this appears if there are in the circulation injurious matters of bacterial or chemical nature.

Sections XIX.—XXII. Reviewed by PROF. GREEFF, Berlin.

XIX—RETINA AND FUNCTIONAL DISTURBANCES.

594. HIRSCHBERG. Acute hypotony as opposed to acute hypertony of the eyeball. *Centralbl. f. Augenheilk.*, xxii., p. 207.

595. SCHNORR. On retinitis circinata. *Inaug. Dissert.*, Berlin 1898.

596. GOLDZIEHER. On a hitherto undescribed ophthalmoscopic appearance (interstitial fibromatous degeneration of the retina). *Pester med.-chir. Presse*, No. 49, 1898.

597. HAMMAR and ÖHRWALL. Examination of the retina in a case of partial macropsia. *Upsala läkereförenings Förhandlingar*, 1898, iii., 7.

598. AMMANN. The retinal hemorrhages due to diseases of the blood and vessels. *Beiträge z. Augenheilk.*, 1898, 33.

599. FLEMMING. A case of retinitis proliferans in which the eye was examined after death. *Trans. Ophth. Soc. Un. K.*, xviii., p. 154.

600. LAWSON and SUTHERLAND. A case of albuminuric retinitis in a child aged twelve years. *Ibid.*, p. 140.

601. ROCKLIFFE. Pseudoglioma. *Ibid.*, p. 139.

602. ROCKLIFFE. Cystic degeneration of the retina. *Ibid.*, p. 165.

603. DAVIS. Report of recovery of a case of hemorrhagic albuminuric retinitis. Remarks as to ætiology and pathology. *The Post-Graduate*, Nov., 1898.

604. ZIMMERMAN. Some cases of toxic amblyopia, three of which show partial reversal of the color fields. *Annals of Ophth.*, Oct., 1898.

605. LAUTENBACH. Some results in cases of tobacco amblyopia. *Four. Am. Med. Assoc.*, Oct. 1, 1898.

606. ELLETT. Some severe cases of tobacco and quinine amblyopia. *Ibid.*

607. HOLDEN. Pathological report on the eyes of Dr. Hirsch's patient with amaurotic family idiocy. *Four. of Nervous and Mental Disease*, July, 1898.

608. DE SCHWEINITZ. Symmetrical changes at the macula following iritis probably due to degeneration of the retinal ganglion cells. *Ophth. Record*, Nov., 1898.

609. BALL. A case of quinine amblyopia. *Ibid.*, Oct., 1898.

610. BRUNER. Ring scotoma with night blindness. *Ibid.*, Nov., 1898.

SCHNORR (595) collects all the reported cases of retinitis circinata, and adds a new case observed by Greeff in a woman of sixty. The white ring about the macula was complete.

GOLDZIEHER'S (596) patient was a woman of twenty-three who had been blind for three years in the right eye, while the sight of the left eye had failed recently. By lateral illumination one saw behind the right lens the degenerated retina which was divided by numerous folds into several prominent elevations. On the surface were many new-formed vessels. In the left eye through the clear media the disc was seen to be greatly swollen and of greenish hue, as was the surrounding retina. The vessels were greatly enlarged. There were many folds and elevations in the retina, but no detachment.

The recently deceased physiologist, Paul Halmgren, suffered from 1880 with central macropsia and metamorphopsia of the right

eye due to hemorrhages and lustrous spots in the macula. He had described his subjective symptoms, and requested that the eye be examined microscopically after his death, which has just been done by Professor HAMMAR (597). The results were as follows: In the outer nuclear layer and in Henle's fibre-layer near the macula were many hemorrhagic cysts and small fresh hemorrhages. About the fovea and below it were found changes in the cones, possibly due to their crowding together. Above the fovea the cones were entirely destroyed. ÖHRWALL adds some remarks in which he attributes the macropsia to the crowding together of the cones. DALÉN.

AMMANN'S (598) paper is interesting both to the oculist and to the practitioner of internal medicine. He divides hemorrhages into those due to diapedesis and those due to rupture, the latter mostly being of traumatic origin, and rarely, also, following strained muscular efforts. From Haab's practice and the records of the Zurich clinic comprising notes of 60,000 patients he collects 90 cases which he tabulates as follows:

1. Senility	57
<i>a.</i> Retinal hemorrhages in general.....	13
<i>b.</i> Macular hemorrhages.....	11
<i>c.</i> Venous thrombosis.....	33
2. Lues.....	1
3. Alcohol and tobacco amblyopia.....	7
4. Scorbutus.....	1
5. Spontaneous and recurrent hemorrhages in the adolescent.....	10
6. Anæmia.....	8

ZIMMERMAN (604) reports the histories of 6 cases of combined tobacco and alcohol amblyopia. There was always a central—peri- or para-scotoma for red and green, and some slight contraction of the field for form. In three cases there was a partial reversal of the normal order in which the colors are perceived at the periphery of the field. The main treatment is abrupt cessation of the poisons. Sweating, strychnia, mercury, and iodides are also useful. BURNETT.

LAUTENBACH (605) is of the opinion that slighter forms of tobacco amblyopia are much more common than is generally suspected. The use of tobacco in other forms than smoking does not, he believes, produce amblyopia. It also affects particularly

the young, most of the cases he has seen being under twenty-one years. Besides the iodides and strychnia, he has found hot plunge baths very beneficial in treatment. The histories of 6 cases are given.

BURNETT.

In the case of quinine amblyopia, which is the one of chief interest of those reported by ELLETT (606), the patient, a man of thirty, took 120 grains in the course of 12 hours. It was 4 days afterwards that he noted failure of sight, which in a few hours was reduced to perception of light. In 3 months he regained V equal to $\frac{5}{200}$ in R, and $\frac{6}{200}$ in left, at which it remains. There is a relative ring scotoma in one eye and a positive central scotoma in the other. The nerve is white and the retinal vessels attenuated.

BURNETT.

In this case of amaurotic family idiocy or Tay's disease there was in life the usual whitish patch about each macula and the optic discs were pale. HOLDEN (607) found a degeneration of all the ganglion cells in the retina, characterized by alteration in composition and great swelling—the same changes being found in all the ganglion cells of the brain and cord by Dr. Hirsch. The whitish patch occupied that portion of the retina in which the layer of swollen and opaque ganglion cells was three or more cells deep and gradually faded away a disc-diameter from the fovea where the ganglion-cell layer becomes thinner. The atrophy of the optic nerves is to be regarded as a degeneration of the axis-cylinders which arise from the affected ganglion cells in the retina.

DE SCHWEINITZ (608) gives the history with a picture of a peculiar degeneration at the macula in both eyes, the one following the other at a period of a year. He at first thought these spots might be due to hemorrhage, but he is now convinced that they are due to changes in the ganglion cells of the retina.

BURNETT.

In BALL'S (609) case a man of sixty-one took 60 grs. of quinine in 12 hours. The next morning he was totally blind and very deaf. On the third day, when seen by Ball, the pupils were dilated. V. p. l. in R, fingers at four inches in L; Tn. Retinal arteries and veins remarkably contracted, optic disc pale. No treatment. In about a year V with correction of ametropia $\frac{2}{20}$ in R, $\frac{3}{20}$ in left. Fields are given showing the amount of contraction, two weeks, thirty-six days, and a year after the attack.

BURNETT.

In the case reported by BRUNER (610) there was a small ring scotoma symmetrical from above down and out, of 10° at its widest part, and leaving a free centre of about 10° . It is in all probability congenital. Vision is somewhat reduced and there is great difficulty in reading. There is no change in the fundus to which the phenomenon can be attributed. There was also a complaint of night blindness which was considered congenital also.

BURNETT.

XX.—OPTIC NERVE.

611. KLOPPER. Optic neuritis in consequence of heredity and congenital disposition. *Inaug. Dissert.*, Tübingen, 1898.

612. GINSBERG. A case of recurrent retro-bulbar neuritis. *Wjest. Ophth.*, xv., 1, p. 32.

613. ROCHON-DUVIGNEAUD, and STANCULEANU. Contribution to the study of lesions of the optic nerve as determined by intracranial neoplasms. *Arch. d' opht.*, xviii., 10, p. 615.

614. DEYL. A new explanation of the development of oedematous optic neuritis. *Ophth. Klin.*, ii., 2, p. 27.

615. SANTOS FERNANDEZ. Differential diagnosis between malarial and quinine amaurosis. *Four. of Eye, Ear, and Throat Diseases*, iii., 1, p. 1.

Leber first described the form of optic-nerve disease that comes on with a central scotoma affecting the male members of a family about the age of puberty. KLOPPER (611) records the history of such a family in which several male members were affected. There was no tuberculosis in the family and no symptoms of other nervous disease. The parents, however, were related.

In a case of cerebellar tubercle, in which ROCHON-DUVIGNEAUD and STANCULEANU (613) found marked choked discs and later slight atrophy of the discs with complete blindness, a considerable quantity of liquid was found in the ventricles, particularly the third, but there was only a moderate distension of the optic-nerve sheath from subarachnoid oedema. The optic nerve exhibited an atrophy increasing toward the brain, the axis-cylinders being broken down. The authors discuss the various theories of choked disc and incline to Parinaud's view, who regards the oedema of the sheaths as a continuation of the oedema of the brain, which may disappear with the latter. It

seems to the authors to be superfluous to assume a special toxic action of the œdema as the cause of the changes in the nerve, since every œdema, even in other parts of the body, is in a sense toxic, *i.e.*, it may interfere with nutrition. The disturbances seem to take place first in the axis-cylinders, these being greatly changed or even absent when the myelin sheaths are still present. The atrophy was only moderate and appeared to be only beginning, although there was complete amaurosis. Since the atrophy advanced from the intra-cranial toward the intra-orbital portion of the nerve it is to be considered a descending atrophy.

V. MITTELSTÄDT.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

616. STEINDORFF. The isolated, direct injuries of the optic nerve within the orbit. *Inaug. Dissert.*, Halle, 1898.

617. HÜME. On injuries of the eye from kicks. *Inaug. Dissert.*, Leipsic, 1898.

618. CZERMAK. Contusions of the eyeball. *Sitzungsber., Prager med. Wochenschr.*, 1898, p. 604.

619. BARCK. A case of avulsio bulbi. *Amer. Jour. of Ophth.*, Dec., 1898.

620. ROTHENPIELER. Luxatio bulbi. *Beiträge zur Augenheilk.*, 31, p. 1.

STEINDORFF (616) describes in detail the clinical picture of isolated direct injury of the optic nerve, abstracts the cases already reported, and adds seven new case histories from Hippel's clinic in Halle. Microscopic examinations were made in the cases that were fatal. The writer concludes, with Wagenmann, that the secondary pigmentation of the retina after lesions of the optic nerve depends upon simultaneous injury of the ciliary vessels.

HÜME (617) describes five cases in which the eye was injured by a kick. The direction of the injury is usually from below upward, and usually the skull is fractured and the margin of the orbit is crushed. The eye is usually lost from internal injuries.

CZERMAK (618) presented three cases of contusion of the eyeball. In two the sclera had been ruptured far back and not in the zone lying between the cornea and the attachment of the muscles, the usual seat of rupture. In both there was some

exophthalmus, the anterior chambers were deep, the irides were tremulous, the balls were soft, and there were extravasations of blood in the lids and bulbar conjunctiva. In the third case, the cornea was burst by a blow, and the lens with ruptured capsule was dislocated into the anterior chamber. HERRNHEISER.

In BARCK'S (619) case a man was thrown from a wagon face downwards on some stones. He was not rendered unconscious, but when he regained his feet he found his left eye lying on his cheek. The physicians who saw him soon after found the globe attached to the orbit only by the superior rectus, which was clipped off and the globe fell off. The optic nerve enclosed in its sheath was twenty-three *mm.* long, and there were some ciliary nerves attached to the ball. The length of the remaining tendons was from seven to eight *mm.* The conjunctiva of the lid was not much distended, and the eye looked clean as after an enucleation. The lids did not seem to be injured, but there was a fracture of the right nasal bone and a complete severance of the ala nasi. BURNETT.

ROTHENPIELER (620) collects the literature of the luxation of the eyeball and considers the various theories that have been offered to account for its production. He adds a case of his own in which a man was struck with a shovel. The right eyeball lay in the palpebral fissure about two *cm* anterior to a plane corresponding to the margins of the orbit. An attempt to replace the ball, in narcosis, was unsuccessful, and the pain was so great that enucleation was done.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

621. PETERS. Headache from ocular disturbance. *Sammlung zwangloser Abhandlungen*, Halle, C. Marhold.

622. BOAS. The eye symptoms of tabes and of multiple sclerosis. *Zwangloser Abhandlungen*, Vossius, ed., Halle, C. Marhold, 1898.

623. JACOVIDÉS. A case of alternating and intermittent hysterical mydriasis. *Arch. d' opht.*, xviii., 10, p. 645.

624. JEAUSELINE and MORAX. Ocular manifestation of lepra. *Ann. d' ocul.*, cxx., p. 321.

625. GALEZOWSKI. Ocular accidents due to influenza. *Rec. a' opht.*, 1898, p. 673.

626. DIANOUX. Ocular disturbances observed in diabetes. *Ann. d' ocul.*, cxx., p. 248.

627. KLAUS. On conjugate deviation of the eyes in brain diseases. Marburg, Elwert'sche Buchhandlung, 1898.

628. KUNZ. On tuberculosis of the eye and its adnexa. *Inaug. Diss.*, Marburg, 1898.

629. EICHHORST. Some remarks on intermittent reflex iridoplegia in tabes. *Deutsch. med. Wochenschr.*, 1898, p. 357.

630. AXENFELD. On the ocular complications, particularly purulent inflammation of the ball, in suppurative cerebro-spinal meningitis.

PETERS' (621) treatise is very readable. The sensory branch of the fifth nerve supplies not only the eye and its adnexa but also, by means of the recurrent branch, the dura mater and, through the supraorbital nerve, a great portion of the skin of the head. In cases of eye strain either the nerves supplying the dura are affected, giving rise to true headache, or a supraorbital neuralgia is brought about.

BOAS (622) presents in a clear manner the eye symptoms of tabes and of disseminate sclerosis, and his treatise will be of value to the general practitioner, for these eye symptoms are often early and on their recognition may depend the diagnosis.

In a hysterical woman of twenty-six, with right hemianæsthesia, JACOVIDÉS (623) observed a dilatation and complete absence of reflexes in the right pupil, lasting two months, and a recurrent dilatation of the left, alternating with the right, lasting a few hours. In both eyes there was amblyopia with contraction and reversal of the color fields. Under hypnotic treatment the conditions were restored nearly to the normal. The hemianæsthesia shifted with the dilatation of the pupil. V. MITTELSTÄDT.

Clinical observation and the microscopic examination of a number of leprosy eyes lead JEAUSELINE and MORAX (624) to speak of the different reactions which may be produced by the same pathogenic micro-organism. Comparisons of ocular leprosy with syphilitic and tuberculous affections show, also, that the same anatomical changes may be brought about by entirely different micro-organisms. The microscope shows that the leprosy and the tubercle bacilli cause the same sort of interstitial keratitis that is found in hereditary syphilis. The fact that different sorts of infection may produce like pathological reactions (whose clini-

cal course, however, varies with the cause) should lead us to discard pathological diagnose (such, for example, as interstitial keratitis) for ætiological diagnose (such as syphilitic, tuberculous, and leprous keratitis).

SULZER.

GALEZOWSKI (625) describes a purulent conjunctivitis which appears in the course of influenza although he grants that a catarrhal conjunctivitis is more frequent. He mentions, also, a serous retinitis which he attributes to influenza.

SULZER.

DIANOUX (626) collects his personal experiences in diabetic affections of the eye in a paper which presents many points of interest. The diabetic cataract develops only in the young, who are suffering from the acute pancreatic form of the disease [wrong—H. K.]. Chronic diabetes and acute diabetes in middle age do not cause cataract. Dianoux has seen several patients die a few days after operation for diabetic cataract, from pulmonary hemorrhage.

Retinal hemorrhages do not occur in young diabetic patients but in the middle-aged and particularly in the old. When they do occur there will always be found an advanced degree of arteriosclerosis.

SULZER.

KLAUS (627) examined the brain of a patient with conjugate deviation of the eyes, seen in the Marburg clinic for internal medicine; his conclusions were as follows:

1. The centre for the voluntary latent movement of the two eyes (and of the head) lies in the location pointed out by Ferrier and others, viz., the post-frontal region, probably in the second and third frontal convolutions.

2. Other cortical regions may produce conjugate deviation by way of the reflexes, (a) from the visual sphere as a reflex movement after visual perception or light sensations, and (b) from the auditory sphere as a reflex movement after auditory perceptions.

KUNZ (628) reviews the literature, and adds two histories of tuberculosis of the eye, one being tuberculous iritis and the other ulcer of the palpebral conjunctiva. In Mayweg's clinic tuberculosis of the eye is found in 0.08 per cent. of patients.

Since Argyll Robertson first called attention to reflex iridoplegia in tabes this has come to be considered a very constant symptom and one of great diagnostic value. Erb was the first to show that the symptom might be intermittent. EICHHORST (629) reports two cases of this sort in detail. At times there was typical reflex iridoplegia; at others, normal pupils.

AXENFELD (630) describes the eye changes occurring in cerebro-spinal meningitis.

1. Conjunctivitis is frequent. A chemosis of the conjunctiva may appear, sometimes being due to an extension of the inflammation through the sphenoidal fissure into the orbit.

2. The frequency of basal meningeal exudation explains the muscular paralyses which are often seen, and which usually clear up later.

3. Pressure on the fifth nerve may lead to neuro-paralytic keratitis.

4. Of importance are those cases in which there is sudden complete blindness from inflammation or from pressure exerted by an exudation. The location of the lesion, whether basal or cortical, will be revealed by the state of the pupillary reaction.

5. The meningeal inflammation may extend down the nerve as a perineuritis.

When a purulent inflammation in the eye arises in the course of a purulent meningitis there may be three modes of development. Micro-organisms may have passed into the eye from the nerve sheaths, or have been present in such number in the orbit that their toxins have penetrated the eye, or, finally, there may have been a metastatic infection through the blood current.

NOTICES AND REVIEWS OF BOOKS.

XXIV. **Defective Eyesight.** THE PRINCIPLES OF ITS RELIEF BY GLASSES. By D. B. ST. JOHN ROOSA, Professor New York Postgraduate Medical School and Hospital, Surgeon Manhattan Eye and Ear Hospital, etc. New York : The Macmillan Co. (66 Fifth Avenue) ; London : Macmillan & Co., 1899. Price, \$1.

This is a very neatly gotten-up small-octavo volume of 193 pages, with 36 text illustrations, and a set of Snellen's test types, in English, for examination of both near and distant vision. It appeals to the ophthalmic practitioner, but also to the general physician who wants to familiarize himself with the diagnosis and management of the errors of refraction, especially the proper selection of spectacles. The text from the beginning to the end is distinguished by remarkable clearness, all mathematical and physical difficulties being avoided. The book is practical throughout. The methods of examination are minutely described, with a view to self-instruction, yet where this appears difficult, as, for instance, in the use of the ophthalmometer, the student is informed of the desirability of having a tutor. A small trial case, at the price of about \$12, would do to diagnose and treat uncomplicated cases, but is by no means sufficient for the practitioner who desires to be able accurately to fit any given case. Chapter i. treats of the measurement of the visual power. Chapter ii., of presbyopia, with an introduction on the invention of spectacles, and the mechanism of accommodation ; then follows the description of simple presbyopia, and its combination with the various kinds of anomalous refraction, myopia, hyperopia, and astigmatism. At the end of the chapter, the so-called "second sight" of old people is mentioned. "It is not a blessing, but usually a stage in a disease of the lens—a swelling. This, of course, makes the eye myopic." As far as the reviewer knows,

this myopia is in all cases a sclerosis of the nucleus of the lens, which need not be, and in his experience mostly is not, accompanied by swelling of the lens. The myopia explains itself by the fact that a lens the concentric layers of which increase in density from the periphery to the centre, has a greater refractive power than a homogeneous lens having throughout the density of the densest part of its nucleus.

In Chapter iii., Myopia, stress is laid on the necessity of examining the eye for organic causes of amblyopia; viz., opacities of cornea and lens (examined with oblique illumination), opacities of the vitreous, and fundus diseases, requiring experience in ophthalmoscopy. In cases suspicious of artificial myopia, *i. e.*, spasm of accommodation, especially in children, sulphate of atropia (gr. 4: $\frac{3}{4}$ 1) should be instilled into each eye after each meal, for two or three days. The correctly determined glasses should be worn pretty constantly. In low degrees of hypermetropia, Chapter iv., of otherwise healthy eyes, glasses need not be used for distant vision, even if asthenopic symptoms are present. It is different when hyperopia is combined with astigmatism, either with or against the rule. The detection of astigmatism, even if S is $\frac{3}{8}$, is important.

Chapter v.—Corneal Astigmatism. “In astigmatism with the rule, in young persons, even if a considerable degree of hyperopia co-exist, as it almost always does, it is sufficient to allow one half of a dioptré to be corrected by the action of the crystalline lens in accommodation, and to correct the remainder by a glass.” This chapter contains an excellent description of the use of the ophthalmometer. The author relies chiefly on the results obtained with this instrument.

Chapter vi.—Asthenopia. This distressing symptom, according to the author, may have its cause in anomalies of refraction or constitutional diseases, especially neuroses. He does not, and never did, recognize in lack of muscular balance the cause of asthenopia. Chapter vii. contains general remarks on lenses, recommending periscopic and toric lenses as superior to the biconvex or biconcave, being lighter, and lacking the distortion when people see through their edges.

What the book offers is good and to the point. The practical rules governing the detection of errors of refraction and the selection and use of glasses, are supplemented, school-booklike, by a sufficient number of illustrative cases, an excellent feature for

those desirous of drilling themselves, which in this department is as necessary as in any other. What, in the reviewer's judgment, should be taken exception to, is the too pronounced personal standpoint of the author. We agree with him that the lack of muscular balance as a factor in the production of asthenopia has, especially in recent American literature, been exaggerated, but we are far from totally denying it, as the author seems to do. Of the objective methods of determining the refractive state of the eye, the ophthalmoscope is only incidentally mentioned, and the method by retinoscopy completely ignored, though by competent observers it is declared the most accurate and easiest to learn. Surely it has become the most popular, and has the advantage over ophthalmometry of being simpler, and of measuring the refraction of the whole eye and not, as the ophthalmometer, only that of the cornea; in fact, the ophthalmometer measures only the refractive difference of the corneal meridians. This, no doubt, is a great deal, and the reviewer, from personal experience, fully agrees with the author that it is easy to add the necessary spherical lens when, in any given case, the astigmatism of the cornea is ascertained. The strongly marked individuality of the author makes the little book very attractive, and will, despite some omissions, secure for it a good deal of deserved popularity.

H. K.

XXV. *Leçons de Clinique Ophthalmologique*, Professées à l'Hôtel-Dieu par PH. PANAS, Professeur de Clinique Ophthalmologique à la Faculté de Médecine, Chirurgien de l'Hôtel-Dieu, Membre de l'Académie de Médecine. Recueillies et Publiées par le Dr. A. CASTAN (de Bégiers). Paris, Masson & Cie. Editeurs, 1899. 1 vol. in 8°, broché; frs. 5.

We are indebted to Dr. Castan for having compiled and edited the course of lectures delivered at the Hôtel-Dieu, in Paris, by Prof. Panas. It is an excellent custom of the prominent professors of the Paris Medical Faculty to write out and publish, or have compiled and published by an able assistant, their lectures at the hospitals or in the École de Médecine. The reviewer has an ineffaceable recollection of a course on experimental physiology which in his student days was given at the Sorbonne by Claude Bernard, and centred in the discovery of the glycogenic function of the liver. The experiments were the essential feature of the course, but the methods of experimentation and the results afterward published were an invaluable help to the comprehension

and remembrance of what the students had seen and heard. It is the same with clinical courses where the patients, the diagnoses and treatment of their diseases, form the essential feature of the course, but the published analyses, comments, and critical remarks are an invaluable supplement to the diagnostic and operative procedures of the cases, not only for those present, but for a much wider circle who will with interest and benefit read what is the opinion of the representative teachers of the Paris Faculty to-day.

The present volume of 322 pages, neatly gotten up, in easy and colloquial style, always in good taste, is a good sample of the above custom of the Paris teachers. In fifty-six lectures it treats of a multitude of ophthalmic subjects, of which we can mention only a few. The introductory lecture treats of the complexity of the ocular pathology, showing what a vast amount of anatomy, physiology, and pathology is exemplified in the little organ of sight. The professor dwells on the significance of laboratory work as a constant companion of the clinic, and of the importance of embryological studies to understand the nutritive and secretory processes of the eye. He ascribes to the outer layers of the retina, the secretion of the vitreous and the nutrition of the lens, as well as the production of the retinal purple. He says, however, that the clinique is the starting-point and the final object of the laboratory studies. The lectures are all interesting reading. We mention : surgical treatment of entropion and trichiasis ; summer conjunctivitis ; tenonitis and double orchitis ; the sarcomas of the orbit ; orbital exostoses ; wounds and concussions of the orbit ; pathogenesis and treatment of functional strabismus ; bullous keratitis ; pathogenesis and treatment of hypopyon ; Hutchinson's keratitis ; keratoconus ; serous iridochoroiditis ; syph. gummas of the eye ; affections of the lens ; hemorrhage of the vitreous ; retinal affections, 6 lectures ; optic nerve, 6 also ; motor nerves, 2 ; and general considerations 3 lectures.

XXVI. A Text-Book of Ophthalmology. By Dr. ERNEST FUCHS, Professor of Ophthalmology in the University of Vienna. Authorized translation, revised from the seventh enlarged and improved German edition by A. DUANE, M.D., Assistant Surgeon Ophthalmic and Aural Institute. Second American edition. Octavo, 860 pages, with 275 illustrations. Price, cloth, \$5 ; sheep, \$6. Sold by subscription. D. Appleton & Co., 72 Fifth Avenue, New York.

This work may be considered as the standard text-book of to-day. The present edition is thoroughly revised and brought up to date, which is particularly noticeable in the pathology of corneal diseases,—serpent ulcer, hypopyon, etc. The treatise begins with the examination of the eye. Chapter I: Physical examination; ophthalmoscopy in all its bearings. Chapter II: Functional examination. Cerebral and peripheric (field of) vision, light sense, etc. The organic diseases, which begin with the diseases of the conjunctiva, Chapter III, are always introduced with a concise, very clear, and well-illustrated description of the anatomy of the part. This is one of the strong features of the book. The same must be said of the physiological introductions and explanations of the functional diseases. Chapter IV, anatomy and physiology of the uvea and embryology of the eye, is particularly to be recommended, containing the circulation and nutrition of the eye, and the minute anatomy of the parts on the basis of the latest microscopic researches. The pathology, symptomatology, and treatment are presented with great care, but avoiding unnecessary length. The reviewer knows of no text-book on ophthalmology—and there are many excellent ones—that is so harmoniously prepared, and represents modern ophthalmology so completely as the work of Fuchs. It is chiefly a book for the eye specialist, but may confidently be recommended also to the student, the finer details being set in smaller type which the student may only glance over, reserving a closer study when he is more advanced. In Austria the ophthalmological requirements in the final examination are more extensive than in most other countries, which fact accounts for the popularity of so large a work as a student's text-book,—seven editions in less than ten years.

Dr. Duane, with his well-known facility and accuracy of language deserves the thanks of the English-speaking physicians for his admirable translation, to which he has made some valuable additions, in particular the paragraph on heterophoria, and the use of homatropine and other cycloplegics, and the general subject of the correction of refractive errors. As to the typography of the work, the reviewer finds that it is scarcely equal to the German original.

H. K.

NOTE OF CORRECTION.

In our last number we stated that Dr. HERMANN SNELLEN, Jr., had been appointed Associate Professor of Ophthalmology, at the University of Utrecht. The appointment was "Professor of Ophthalmology," succeeding his father, who retired to gain more time for clinical work at the new Ophthalmic Hospital at Utrecht.

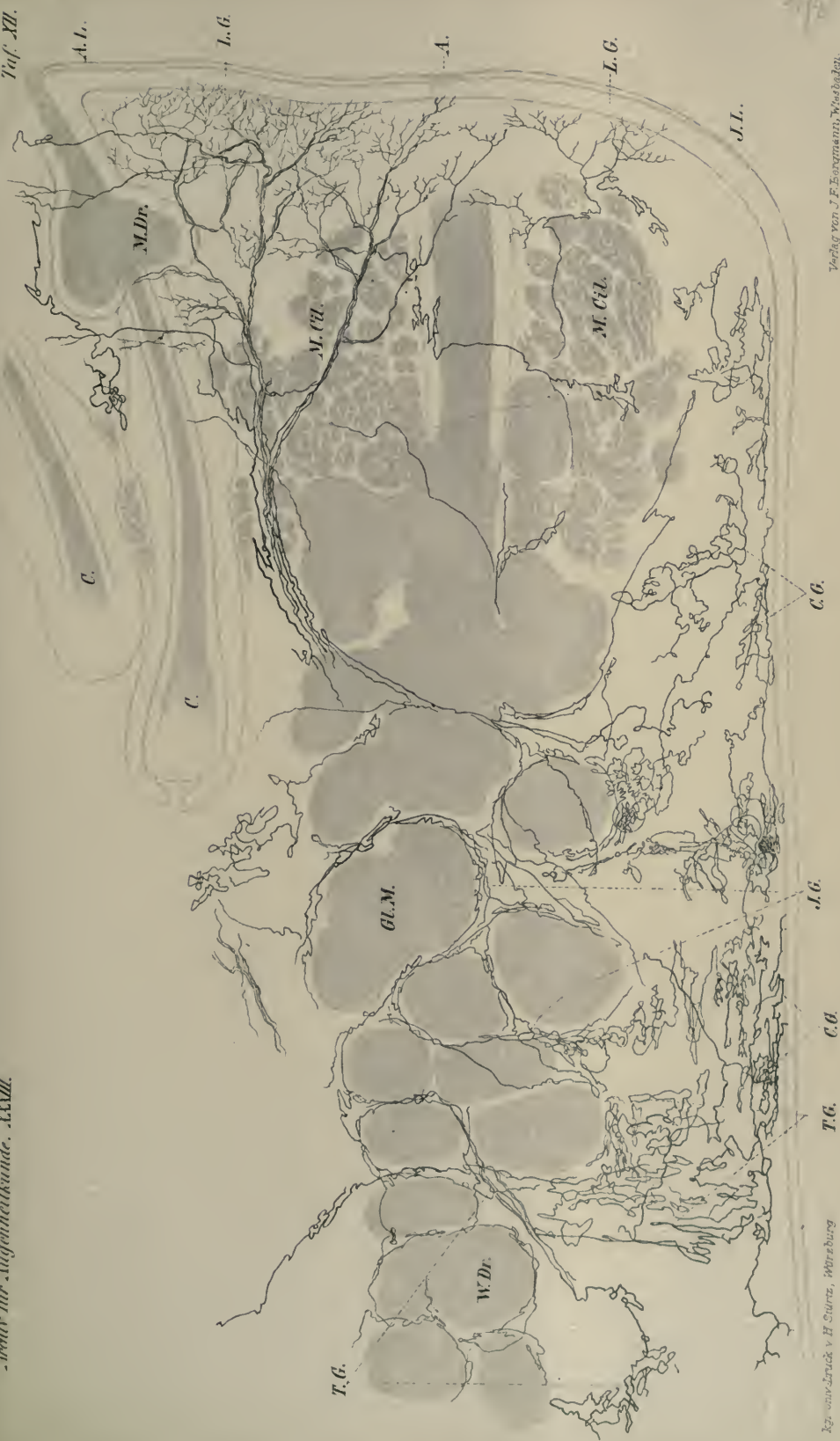




Fig. 1.

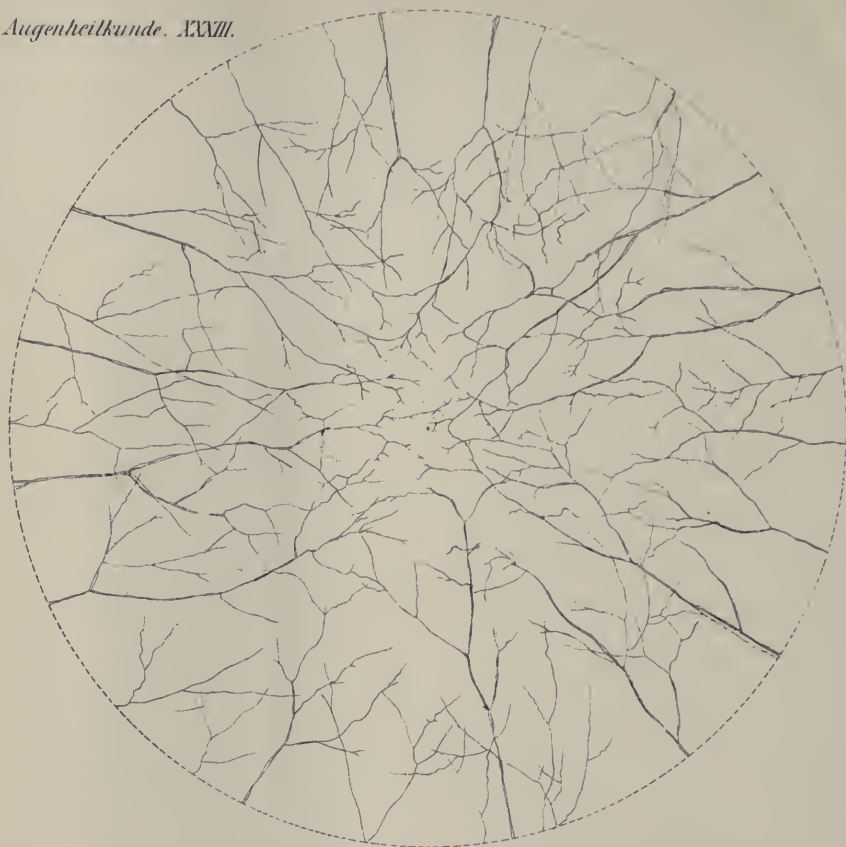


Fig. 2.







FIG. 1.



FIG. 2.



FIG. 3.

ARCHIVES OF OPHTHALMOLOGY.

HYPEROSTOSIS CRANII, WITH THE REPORT OF A CASE LEADING TO EXOPHTHAL- MUS AND BLINDNESS.

BY DR. F. W. ELLIS, MONSON, MASS.

(*With three photographs on Text-Plate X.*)

DIFFUSE hyperostosis of the bones of the head is a rare disease, very liable to implicate the visual organs, which has been hitherto ignored in ophthalmological literature. To guard against errors in diagnosis, the existence of such a disease should certainly be known to the oculist. The affection is so rare, or has been so seldom recognized, that the publication of every case presenting well marked features is desirable. It is probably more common than the small number of reported cases would seem to indicate. It is very likely that, in some instances, it has been mistaken for a new growth in the cranial sinuses.

Exact clinical study of the disease is recent, but its existence has been known for at least two centuries. Malpighi described an enormously hypertrophied skull in 1697. A number of remarkable crania enlarged by hyperostosis are preserved in various museums of Europe and America, but in many instances without any history.

Virchow was probably the first to make a systematic study of the subject. He gave a very good account of the disease in his work on tumors, and applied to it the name *leontiasis ossea*. He regarded the pathological process as a local irritation and inflammation.

Knowledge of the affection was considerably extended in 1892 by the independent publication in Paris of theses by Baumgarten¹ and Millat,² both of whom regarded it as an

¹ La leontiasis ossea (hyperostose des os de la tête).

² De la leontiasis ossea, hyperostose diffuse des maxillaires supérieurs et du crâne.

independent affection distinct from acromegaly, ostitis deformans, and other pathological conditions attended with enlargement of bones.

Quite a number of the clinical studies of the disease have been made in the United States. The first American paper describing a case of the obscure malady was by Starr.¹ Dr. Starr regarded his case as one of an undescribed disease related to acromegaly, and gave to it the name megalcephalie. A little later Putnam² published a paper of great excellence, in which he described four new cases, to which was appended the account of a fifth by Prince. Accompanying this article was another by Edes describing a sixth case.

A very recent and satisfactory, though brief, account of hyperostosis, to which my attention was kindly drawn by Prof. Putnam, is given by Sternberg³ in Nothnagel's *Specielle Pathologie und Therapie*.

Hyperostosis of the bones of the head occurs under two forms: diffuse hyperostosis, which is the principal subject of this paper, and a form in which the intensity of the pathological process is more localized, and there is a tendency to the formation of tumor-like enlargements. Errors of diagnosis are less liable to occur in cases belonging to the second division. A considerable number of cases of this character have been observed. This variety of hyperostosis affects particularly the jaws, and begins with a circumscribed tumor, accompanied by a diffuse hyperostosis of surrounding parts. The orbit is likely to become involved, in the later stages of the disease. The bony enlargements may attain enormous size, producing horrible deformity. The extension of the disease may produce occlusion of the nose, epiphora, exophthalmus, and compression of the brain and nerves. A case often quoted is that of Forcade, reported in 1734. The son of this surgeon had a lacrymal abscess following an attack of small-pox. A bony growth appeared in the nasal process after the abscess, and extended to the jaws, orbits, and contiguous parts. There were extensive exostoses, marked ex-

¹ *American Journal of the Medical Sciences*, Dec., 1894.

² *American Journal of the Medical Sciences*, July, 1896.

³ *Vegetationsstörungen und Systemerkrankungen der Knochen*.

ophthalmus, and difficulty of speech. An interesting point in this case is that it was supposed to have originated in suppuration of the lacrymal sac. In this connection a case described by Heath,¹ is worthy of note. The patient apparently suffered from double lacrymal abscesses. Hyperostosis followed, which implicated the orbit, pushing the eyes forward. The eyes were subsequently lost; one by inflammation, and the other from a blow. Cases of this character are of importance from an etiological standpoint; especially, as some cases of the diffuse variety of hyperostosis have been ascribed to erysipelas and injury. The etiology of hyperostosis, so far as it is known, lends some support to Virchow's inflammatory theory. It must not be forgotten, however, that lacrymal abscesses may result from hyperostosis. My own patient has had several. It is possible, as has been suggested, that in cases which seem to have originated in inflammation of the lacrymal sac a reversed sequence is the true one. It is conceivable that the abscesses may have been due to stenosis of the lacrymal duct from unnoticed hyperostosis. It is a matter of great importance to determine whether this formidable disease can be caused by lacrymal inflammation, and it is to be hoped that future observations will decide the question.

The diffuse form of hyperostosis, to which we wish to direct our attention particularly, is exceedingly rare, or cases of this variety have been seldom recognized. Only about a dozen cases observed in life have been reported, and nearly one half of these have been described in this country. The beginning of the disease is insidious and generally unnoticed. The larger number of reported cases have begun in childhood or youth. A congenital case is on record. A minority of cases originate later in life, and to this number my own belongs. The duration of the disease is very long, and may extend to twenty or thirty years.

The earliest subjective symptom is generally headache; the later symptoms are mostly explained by pressure on contiguous parts by the hypertrophied bone, the diminution of cavities, and the stenosis of canals. Such symptoms are

¹ Garretson's *System of Oral Surgery*, 3d edition, p. 824.

occlusion of the nasal passages; loss of smell, taste, and hearing; facial paralysis; tinnitus aurium; epiphora; neuralgia; difficulty in swallowing and breathing; and epileptiform convulsions. The patient may become apathetic, and the cerebral functions are liable to be affected. After the disease is well established, the deformity is marked, but varies with the seat of the pathological process. All of the bones of the head may be involved, but in varying degree. The frontal and the upper maxillary bones are generally the most affected. The lower jaw is less often involved. All of the bones of the vault of the cranium may become extensively thickened and sclerosed. The weight of the skull may become very greatly increased, and the sutures to a large extent obliterated. The orbits are very likely to be involved at some stage of the disease. Their capacity becomes greatly lessened by the encroachment of the bony tissue. The exophthalmus is sometimes extreme. Optic neuritis and atrophy are reported in some instances.

The hyperostosis may not be limited to the cranium; the vertebræ also may be affected. This appears to have occurred in Starr's case. It has been stated that in one case some of the other bones of the body were involved. These cases render the supposition that the disease is one of nutrition, allied to acromegaly, worthy of consideration.

In most of the reported cases no apparent cause for the disease has been found, and no characteristic lesions in the soft tissues have been discovered.

The diseases with which hyperostosis cranii is most likely to be confounded are acromegaly, myxœdema, and ostitis deformans. Acromegaly is excluded by the absence of enlargement of the hands and feet; myxœdema, by the condition of the subcutaneous tissue. Ostitis deformans is less easily eliminated. Diffuse hyperostosis generally begins early in life, ostitis deformans after forty. The changes in the long bones, the characteristic gait and posture in ostitis deformans, together with the fact that the head is less involved in this disease than in hyperostosis, should be sufficient to enable a differential diagnosis to be made.

No known treatment has any effect upon the disease. It

is to be hoped that accumulated observations and future research will disclose its nature, and that means of staying its progress may be discovered.

The patient is a man sixty years of age. His father was healthy but was killed when the patient was very young. His mother died at the age of seventy-six. He had seven brothers and sisters, all of whom are alive and well with the exception of a sister, the cause of whose death he does not know. He was well up to the age of fifteen, when he had an attack of typhoid fever. He went to sea at eighteen, and followed it for six years. He had an attack of dysentery which lasted two months, and what he terms a "touch of the scurvy" during this time; but no other illness until the beginning of his present trouble. Four of his children died in infancy; six are living in good health.

The patient began to have severe headaches, which recurred almost daily, about twenty-eight years ago. About seven years later his friends began to notice an increased prominence of his eyes. His general health remained good, however, and he was enabled to continue his occupation of farming without difficulty. Twelve years ago he suddenly noticed that he could not see with his left eye. A few months later the sight of his right eye began to be affected.

My notes, taken in June, 1887, state that there had been three lacrymal abscesses, at various times, on the left side, and, at the time of writing, one was threatened upon the right. The tears overflowed, and the nose was so occluded that he could not breathe through it. The sense of smell was almost entirely lost. There was very marked exophthalmus, and the eyes had lost a large share of their motility. The head was unusually large; the enlargement particularly affecting the temporal regions. The infra-orbital regions were very prominent. The deformity was very marked. There was only perception of light in the left eye. Both eyes were myopic 2.50 D. The central vision of the right eye was $\frac{1}{30}$, but its visual field was contracted. The ophthalmoscopic indications of optic atrophy were marked in the left eye, and present to some extent in the right.

I did not examine the patient again until July, 1896. The photographs Nos. 2 and 3 (text-plate X.) were taken about two weeks later. They should be compared with the first photograph taken thirty years previously, before the onset of the disease. The ap-

pearance of the patient had not changed very noticeably during the nine years that had intervened since the first consultation.

The patient was able to continue his work until seven years ago. At that time he had a sudden attack, the nature of which is unknown, which caused him to fall from his wagon. He thinks he did not lose consciousness at the time, but this is doubted by his friends. He was carried home and was confined to his house for weeks. No very exact conclusions as to his condition at that time can be drawn from the account he is able to give. There was great weakness, and difficulty in walking, but there does not seem to have been any true paralysis. He has been unable to work since this attack. For some time he had occasionally what he calls "dizzy spells," in which he was unable to stand but did not lose consciousness. He has been free from these for several years. He walks with considerable difficulty, and his movements are stiff and awkward.

July, 1896, the central vision of the right eye was $\frac{2}{3}\%$, but the visual field was very much restricted. There was no perception of light in the left eye. After this time the failure of vision of the right eye was rapid. October 26, 1896, the vision of this eye was hardly $\frac{2}{1000}\%$, and its visual field was contracted to an area about ten degrees in diameter. The ability to recognize colors was almost entirely lost, and there were marked ophthalmoscopic evidences of optic atrophy. In a few months all vision was lost with the exception of perception of light in the right eye, which still remains.

The condition of the patient has not changed very materially during the past two or three years. He feels fairly well, and is able to get about. His appearance is very striking. He is a small man and formerly wore a small hat; he now wears a $7\frac{3}{8}$ size. The circumference of the head is 58 *cm*. The enlargement of the cranium chiefly affects the temporal regions and the upper part of the face. The great change in the size and shape of the head is very apparent in a comparison of the first with the last two photographs. The forehead was formerly narrow and the eyes small and deeply set. The exophthalmus is very marked on both sides, and the eyes are widely separated. The centres of the palpebral apertures are 87 *mm* apart. The left eye diverges 5 *mm*. There is almost entire loss of motility of the eyes, especially upwards and laterally. There is no facial paralysis or loss of hearing. The skin and subcutaneous tissues are normal, and

there is no enlargement of the extremities. The leonine expression of the face is very noticeable, and the aptness of Virchow's designation is strikingly apparent.

This case is a typical example of diffuse hyperostosis confined principally to the frontal region and the upper part of the face. The orbits are very much involved. The optic atrophy was very probably occasioned by mechanical interference with the nutrition of the nerves by stenosis of the optic foramina. The contraction of the visual field, before blindness supervened, was the form characteristic of simple optic atrophy.

A very interesting point is that the patient asserts that the myopia of 2.50 D, for which he formerly wore glasses, came on with the hyperostosis. As a sailor he possessed an average acuteness of vision, and had no difficulty in discerning objects at a distance with the unaided eye. It is possible that the myopia was due to the pressure of the muscles of the eye made tense by the pressing forward of the eyeball by the contracting orbit.

The long duration of the disease is worthy of note. It is highly probable that the headaches from which the patient formerly suffered marked the beginning of his disease. This would indicate a duration of nearly thirty years. It should be noted that the disease began after the age of thirty, unlike the majority of reported cases. It does not seem to be progressing to any extent. Measurements of the head taken recently agree very well with those made three years ago. A gratifying feature of the case is the improvement in the cerebral symptoms. As these symptoms were probably due to compression of the brain, or interference with its circulation, we have reason to believe that some compensatory change has taken place in the patient's condition.

A CONTRIBUTION TO THE TECHNIQUE OF ADVANCEMENT FOR STRABISMUS.

BY PROF. SCHWEIGGER, BERLIN.

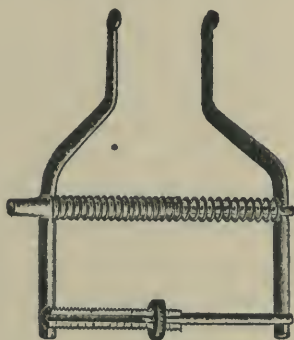
(With one figure in the text.)

Translated by Dr. WARD A. HOLDEN.

IT is well known that if the deviation in convergent strabismus is more than 5-6 mm, or more than 4-5 mm in divergent, the tenotomy of the over-active muscle must be accompanied by advancement of its antagonist. I have seen no effect from advancement alone without tenotomy of the opposing muscle. (See *Archiv f. Augenheilk.*, xxix., pp. 194 and 195.) The dictum then laid down by me (*ibid.*, p. 199) that the shortening of the antagonist must equal the linear measure of the deviation, I have since fully confirmed. Herein lies a practical advantage of the linear measuring of the deviation as proposed by Graefe. The customary method by measuring the angle of deviation furnishes no operative indications, while the linear measure, which is so easy to carry out, indicates at once the amount that the antagonist is to be shortened in the advancement. For the technique of the advancement operation it is, therefore, of importance to find a method which shall determine in the simplest and most accurate way the amount that the muscle is to be shortened.

First, the conjunctiva is divided over the insertion of the tendon and loosened above and below, and then a slightly curved squint-hook, without a bulbous end, is slipped under the muscle. Tenon's capsule frequently hinders us in iso-

lating the muscle, and in such cases it must be dissected from the muscle carefully. One must be sure that he has taken up the entire muscle with the squint-hook, and since it may happen that at its first introduction the hook is passed through the muscle, it is necessary afterward to pass a second hook under the muscle in the opposite direction, so that, if necessary, the first hook may be withdrawn and re-entered in the right position. One hook is then passed under the tendinous attachment of the muscle, while the second hook is passed under from the other side, and the muscle, if necessary, is dissected free. It is now necessary to introduce the sutures into the muscle at the proper point—*i. e.*, as far behind the tendinous insertion as it is



desired to shorten the muscle, and this distance may be measured off on a millimetre scale. If the two hooks are held by an assistant, unavoidably the muscle is more or less stretched, affecting the accuracy of the measurement. In order to stretch the muscle as little as possible and to render the necessary stretching uniform, I have devised a little instrument, which consists of the ends of two squint-hooks 4 *cm* long, a spiral spring which holds them apart, and a screw marked in millimetres which acts against the spring.¹


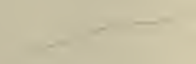
The screw is so arranged that the two squint-hooks are forced apart by the spring only a distance equal to the

¹ To be had from R. Wursch, manufacturer of surgical instruments, Berlin, C. Neue Promenade 5.

length of muscle which is to be removed. This adjustment of the instrument is made, of course, before the beginning of the operation, and the distance between the two squint-hooks may be accurately measured either by the scale on the instrument or by another scale. After the muscle is dissected free the instrument is pressed together with the fingers and passed beneath the muscle between the two squint-hooks which are held by the assistant. The squint-hooks are then removed and the instrument is left to the working of the spring, which pushes one hook beneath the tendon toward the cornea, while the other hook indicates the place where the sutures are to be introduced. It is immaterial whether the instrument is inserted beneath the muscle from above or below; it is to be determined in each particular case how it may be introduced. The muscle is not stretched by this instrument and the shortening necessary corresponds exactly to the previous measurement. The catgut sutures are introduced close to the peripheric hook, one suture being passed beneath the muscle from above, emerging below the centre of the muscle, the second suture being passed from below, emerging above the centre of the muscle. If it is seen that the muscle is poorly developed, as is frequently the case in high degrees of strabismus, the effect may be increased by introducing the sutures, not at the inner side of the peripheric hook, but at its outer side. After the sutures are properly introduced, the muscle is cut and sutured to the tendinous attachment, but in such a manner that the sutures pass beneath the tendon through the superficial layers of the sclera.

I am not accustomed to correct more than 6 mm of deviation, and when there is more the operation is divided between the two eyes. Advancement is made on one eye and, some weeks later, when the permanent effect is reached, the other eye is operated on, tenotomy with or without advancement being done according to the amount of deviation. In cases of divergent strabismus the operative effect is, as a rule, less than in convergent strabismus, and here the amount of advancement must slightly exceed the deviation. Even in divergent strabismus following tenotomy of

the internal rectus I have found the suturing of the rectus to the tendon to be of value; the conjunctiva, however, must be very carefully dissected to guard against cutting with the conjunctiva the insertion of the tendon, which is usually united to it by the scar.



DISTURBANCES OF CIRCULATION IN THE RETINA FROM ARTERIO-SCLEROSIS.¹

BY C. ZIMMERMANN, M.D., MILWAUKEE, WIS.

THE causes of disturbances of circulation in the retina very often remain unexplained. Even in the well-studied field of embolism of the central retinal artery cases occur in which the origin of the embolus cannot be found, especially if there is no heart disease. Kern (*Inaug. Diss.*, Zuerich, 1892), for instance, published ten such cases out of twelve, and gives a critical review of the incident literature. He found that in 66 per cent. of eighty-three cases no certain cause of embolism was given, and reached the conclusion that in the majority of cases presenting the aspect of embolism of the central retinal artery not embolism, but thrombosis, in consequence of a local affection of the artery, mostly atheroma, had taken place. In twenty-four cases arterio-sclerosis, in five symptoms of chronic nephritis, and in six syphilis could be revealed. Wagenmann (*v. Graefe's Archiv*, 44, p. 219), who also discussed these questions in an elaborate paper, designated it as the task of further investigations to ascertain more thoroughly the influence of local disease of the retinal arteries on the creation of disturbances of circulation, especially arterial thrombosis.

According to Ribbert (*Lehrbuch der path. Hist.*, p. 221), arterio-sclerosis of the larger vessels affects all layers of the vascular coats, whereas in the smaller ones it is localized in the intima as *endarteritis proliferans*. Such a condition of the retinal arteries was found microscopically by Reimar in

¹ Extended from a paper read before the Wisconsin State Medical Society at Oshkosh, May 5, 1899.

a case of "hemorrhagic retinitis in consequence of endarteritis proliferans," in which from the ophthalmoscopic appearance the diagnosis thrombosis of the central retinal vein had been made (these ARCHIVES, Ger. Ed., xxxviii., 3, p. 209). All the retinal arteries showed arterio-sclerotic changes: general or partial crescentic thickening of the intima, which consisted of more or less cellular fibrous tissue, as much as almost completely filled the lumen. The endothelium could not be differentiated from the underlying cells of the proliferations, but in all preparations of the central retinal artery it was marked as a central tract of more intense staining, and in most of them lining a long central fissure. From this Reimar infers that a small lumen still existed during life, which was closed by postmortal contraction of the arterial walls. The changes of the intima were not continuous throughout the whole length, but scattered over different places of the same artery. Several twigs were totally obliterated, being transformed in concentric fibrous cords. In some places the adventitia was infiltrated with round cells, invariably so where it was crossed by an obliterated vessel. The veins also revealed phlebitis proliferans, and some small branches were obliterated. These could be distinguished by their homogeneous walls from the more or less marked fibrillar, concentrically stratified coats of the obliterated arteries. Reimar excludes the possibility of thrombosis or embolism in this case from the histological structure, the integrity of endothelium, the absence of remnants of foreign substances, blood-pigment, and reactions of the walls, and thinks that of all cases of thrombosis of the central retinal vein hitherto published an obturating formation in organic connection with the wall existed only in those of Michel (*v. Graefe's Archiv*, xxiv., 2, p. 37), Weinbaum (*ibid.*, xxxviii., 3), and Türk (*Beitr. z. Aug.*, 1896, 24). It was doubtful, however, whether this was an organized thrombus or the product of phlebitis proliferans. In Reimar's case the sudden interruption of circulation was due to *endarteritis proliferans* by which the lumen grew constantly smaller until it became entirely closed, either by sudden sinking of the blood pressure yielding to the contraction of the muscles and elastic

fibres of the arterial walls, or by a primary contraction of the circular muscular fibres. The partial proliferation of the intima is more favorable for the latter mechanism by the formation of a more or less wide fissure which can much easier suddenly collapse than a small central lumen remaining from a uniform concentric thickening of the intima.

This explains the post-anæmic hemorrhages: after increase of the blood-pressure or decrease of the contractions of the arterial walls the lumen again becomes permeable, but now extravasations take place through the arterio-sclerotic walls, which have become more damaged by the temporary ischæmia. Their quantity depends upon the duration of interruption, the degree of degeneration, the amount of blood-pressure, the quality of the blood, etc.

There were also numerous miliary aneurysms in consequence of arterio-sclerosis, which so far have been very rarely described in the retina. Mackenzie and Nettleship saw them in diabetic retinitis, Litten in a case of retinal and cerebral hemorrhages, C. Zimmermann in eclampsia with cerebral hemorrhages (these ARCHIVES, vol. xxvii., No. 5).

The further course of endarteritis proliferans is re-enlargement of the lumen by shrinkage of the hyperplastic intima from regressive changes (caused by the lack of blood supply), as observed ophthalmoscopically by Reimar, or obliteration by organic union of the walls. Relapses occur by affections of other parts of the arterial walls.

Similar anatomical descriptions were published by Alt (*Am. Jrl. of Opthl.*, 1898, p. 303), and by Lurje (*cf.* Friedenwald, these ARCHIVES, vol. xxv., p. 183), and others.

Owing to the sudden closure of the central retinal artery Reimar's case belongs to the class of *embolism*, from which it is distinguished by the copious hemorrhages, and its clinical picture corresponds in many points to that of *thrombosis* of the central retinal vein at first described by Michel (*v. Graefe's Archiv*, xxiv., 2, 1878), but deviates from it through the arterio-sclerosis of the arteries and the condition of the veins which are normal or only slightly engorged.

In another paper Reimar (these ARCHIVES Germ. Ed., xxxviii., p. 291) gives the clinical histories of three cases of

"so-called embolism of the central retinal artery and its branches," with a critical review over the incident literature, from which he derived the following conclusions:

"1st. Total interruption of circulation is characterized by breaking of the blood column into separate cylinders (agglutination of the cells, globular stasis) in the vessels below the impediment.

"2d. Whereas many symptoms of the clinical picture of these cases cannot be explained by the assumption of embolism or thrombosis, the supposition of endarteritis proliferans answers all requirements, and is to be made, when thickening of the arterial walls is visible with the ophthalmoscope. Embolism and thrombosis, which, of course, can occur in the retinal arteries, entail total blindness and globular stasis of the blood columns in the affected vessels."

I beg leave to communicate the following case which is an illustration of *thrombosis from arterio-sclerosis (endarteritis proliferans) of a branch of the central retinal artery*:

A man, aged fifty-two years, while working in his office, on April 5, 1897, suddenly noticed an obscuration of the nasal side of the visual field of his left eye. The vision was not abolished entirely on that side, but everything looked as if covered by a veil, so that he felt greatly annoyed in his work. On April 7th he came to me and presented the following condition: VR— $\frac{1}{2}$ $\frac{5}{6}$. Pupils react normally. Ophthalmoscopically: At a distance of three papillary diameters from the optic disc the upper temporal branch of the retinal artery just before its bifurcation into two secondary branches, is bloodless and appears empty, and the red blood column at that point suddenly stops. It has a gray, instead of a red colour, but is not diminished in size. The same condition prevails in the two branches for a length of about one papillary diameter. Then the upper one shows a small, dark red accumulation of coagulated blood, and appears empty again for a very little way, and three further such distinctly separated dark-red blood cylinders follow until the periphery of that branch has the normal red appearance of an artery filled with circulating blood. The inferior twig of the bifurcation is also gray in the extension of one papillary diameter, whereas its continuation and further branches are seen as red but thinned vessels. This infe-

rior branch crosses the upper temporal vein just below the arterial bifurcation. The portion of the vein between this crossing and the next two peripheral ramifications is extended and thicker than the rest above and below, but the whole vein is thicker peripherally and is growing thinner towards the optic disc. (The same observation of Reimar has been mentioned above.) Sometimes it appeared as if there was a slight pulsation in the enlarged vein. The retina tributary to the upper temporal artery is opaque, *i. e.*, from the point of interruption of circulation, the upper border of the opacity runs a little way above the upper branch, and the nasal border a little centrally from the lower branch towards the periphery and down towards the macula. It gives the well known aspect as in embolism of the central retinal artery, and the macula appears as a red spot, more marked than the remaining normal fundus. Corresponding to this grayish area of the retina, a defect of the visual field in the lower nasal quadrant is found. If we take as the zero point the right end of the horizontal meridian the scotoma lies between meridian 205° and 270° in the following manner: in 205° from 10° to 60° , in 225° from 5° to 60° , in 250° from 10° to 45° , and in 270° from 10° to 35° , *i. e.*, the sector-like defect does not reach the centre, and only in two meridians the periphery.

The general health of the patient is good. Syphilis denied; he drinks six glasses of beer a day. Heart shows no disease, second tone is a little more accentuated. Pulse dicrotic, and radial artery tortuous and resistant. Blood vessels of face ectatic. Decided symptoms of *Arterio-sclerosis*.

It seems most natural to suppose that this was a case of embolism of a branch of the central retinal artery. The following reasons, however, speak against this assumption:

First—No embolus could be seen in the obstructed vessel. (According to Reimar an embolus will not form a cast fitting exactly in the vessel, but both its ends will separate the blood column like a wedge.)

Second—There was no heart trouble. The chief source for embolism of the retinal artery is furnished by endocarditis or valvular disease of the heart, *i. e.*, by pieces of the diseased valves or of breaking thrombi. Arterio-sclerosis of the aorta and carotis may also give rise to embolism of the retinal arteries by abrasions of particles of the diseased

intima and thrombi formed on such places. This, however, is not very probable in this case, since more embolisms of other arteries would have been more likely to occur if such changes had existed to any extent.

Third—No evidence of a tumor was found from which particles might have been carried away by the blood-current.

Fourth—There was from the commencement no complete blindness, but only a scotoma which remained, whereas in partial embolism the sight generally becomes entirely abolished when the embolus enters the main artery, and is partially regained after the embolus is conveyed further and becomes blocked in a branch. The interruption of circulation, *i. e.*, the lack of supply of oxygen must not, however, last longer than a few minutes lest the nervous fibres in the optic nerve and retina become necrotic.

Endarteritis proliferans has the same effect if it shuts off the circulation, and, if happening on the limbs, leads to gangrene, but not in the retina, which has two separate vascular systems, and, after closure of the central artery, derives still some nourishment from the chorio-capillaris. The connective-tissue fibres remain intact, but the more sensitive nervous elements are destroyed.

On the other hand, thrombosis of a branch of the retinal artery leaves the main artery intact and never produces initial total obscuration of sight, only a scotoma corresponding to the area of the retina, which derives its nourishment from that branch.

This point as well as other positive symptoms in our case rather indicate that the obstruction of the vessel was due to arterio-sclerosis of the retinal arteries and consequent arterial thrombosis. Besides the arterio-sclerotic changes of the peripheral arteries, the sclerosis of the retinal vessels could be directly observed with the ophthalmoscope. The upper temporal branch above the bifurcation had a cartilaginous bluish-white and transparent appearance from thickening of its inner coat. That the same condition was not found on all branches is not surprising, since arterio-sclerosis is a partial phenomenon which occurs in patches like exanthemata of the skin. Although met with in the length of vessels, its places

of predilection are the ostia of the branches, or bifurcations (Virchow, Thoma, *Virchow's Archiv*, 93, 95, 104-106, and *v. Graefe's Archiv*, xxxv., 2), where it forms rings and leads to stenosis, and further on to ischæmia and autochthonous thrombosis. (Heubner, Leipzig, 1874; Friedlaender, *Cent'bl. f. d. med. Wiss.*, 1876, 4; Baumgarten, *Virchow's Archiv*, 1878, p. 90; Borchard, *Deutsche Zeitschr. f. Chir.*, 44, 1896; Haga, *Virchow's Archiv*, 152, 1, 1898; Wwedenski, *Arch. f. kl. Chir.* 57, 1, 1898; Raehlmann, *Fortschr. d. Med.*, 1889, p. 928; Reimar, *l. c.*).

Then we see, with the ophthalmoscope, disintegration of the blood column which consists in a sedimentation of the red blood corpuscles from the plasma to dark red cylinders. The spaces between the red cylinders are not empty, but are filled with plasma, or are collapsed, contracted, or have thickened walls. The retinal vessels are empty only if their physiological contents are removed, viz., after being cut (C. Zimmermann: "Laceration of the Optic Nerve and the Central Retinal Blood-Vessels," these ARCHIVES, vol. xxvi., No. 1), or at the optic disc during collapse of their walls by the intraocular pressure in venous pulsation, or after death. The arterio-sclerotic portions of the vessels appear as indentations of the calibre of the blood column, but their external contour is as wide as the normal. The thickening of the wall is not always conspicuous, but is recognized by a fine gray or yellowish-gray opacity. Often the thickening is so intense that the diseased portion presents itself as a solid bloodless cord, which may, however, convey circulating blood. A certain symptom of stoppage is the globular stasis below. The degree of visibility of the thickening of the intima is, of course, dependent upon its stage of development.

Clinically correspond to these different stages transient obscurations of sight caused by defective blood supply of the retina in consequence of the retardation of the blood current in the narrowed vessels and finally total blindness.

In our case the endarteritis proliferans terminated in thrombosis, first, because the blindness in the described sector was total and lasting, and second, the globular stasis below the obstruction was permanent.

Lately Wagenmann (*v. Graefe's Archiv*, 44, p. 220) reported a case which showed numerous attacks of fugitive obscurations of sight, which he attributed to spastic constrictions of the retinal arteries brought about by arterio-sclerosis. He thinks that the endarteritic changes exert an irritative influence on the vascular walls and produce spasms of the vessels. During such an attack he could see with the ophthalmoscope complete ischæmia of the retinal arteries, the lumen of which was narrowed by thickening of the intima, with resulting abolition of function. It is an analogous process to the arterio-sclerosis of the coronary arteries of the heart which leads to relapsing stenocardic seizures.

Spasms of the retinal arteries were further observed in epilepsy and some intoxications and general diseases, and were caused by arterio-sclerosis.

Galezowski, Dujardin, and Fraenkel (*Berlin. klin. Woch.*, 1897, p. 341) described cases of thrombosis of the central retinal artery (which in Fraenkel's case presented the aspect of embolism) in influenza, and attribute the cause of it to changes of the arterial wall created by infection or intoxication of the organism. According to v. Leyden the disintegration of white blood corpuscles in infectious diseases produces blood-plates, which are an essential factor in the development of thrombosis, but the latter forms only on those points of the vascular coats which are diseased. Also here arterio-sclerosis plays the most important part, as influenza has a tendency to develop arterio-sclerosis, according to some French authors, who speak of *Artérite grippale*, and to the observations of Curschmann.

Raynaud's disease, which consists in a local asphyxia of the limbs, is sometimes accompanied by disturbances of vision, which, in some cases, the ophthalmoscope proved to be due to contractions of the retinal arteries. The anatomico-pathological changes were, besides neuritis of peripheral nerves, endarteritis and endophlebitis of the smaller vessels.

Panas, who examined the patients at the instance of Raynaud, could not corroborate this statement, and von Frey maintains that artificial constrictions of the vascular muscles equally extend over larger portions of the vessels.

The irregular short indentations which last for some time are no constrictions but diseased portions of the walls (Reimar).

A very important predisposition to thrombosis of the retinal arteries is produced by *syphilitic endarteritis*. Kern reported such cases and Wagenmann one which was very similar to ours. It occurred in a syphilitic patient with very extensive arterio-sclerosis. The retinal arteries were also sclerotic and showed opaque lines. The upper nasal branch was very much thinned and apparently closed by endarteritis and thrombosis, with a corresponding defect of the lower outer quadrant of the visual field. Although it looked like partial embolism, Wagenmann took it for thrombosis on account of the marked arterio-sclerosis of syphilitic origin and the absence of heart trouble.

The ophthalmoscopic condition in our case, although the same as that of embolism, may just as well have been induced by endarteritis proliferans and subsequent thrombosis, since the latter occurred suddenly, and the consequences of acute obstruction must be the same whether caused by an embolus or momentous thrombosis, or simply endarteritis proliferans. For the diagnosis of endarteritis and subsequent thrombosis the ophthalmoscopic arterio-sclerotic changes will be of importance.

The *prognosis* is very unfavorable when the disturbance of sight has existed for some time, as the nervous elements of the retina can survive an interruption of circulation only for a few minutes. Arterio-sclerosis of the retinal vessels, even without thrombosis, is prejudicial to the eye, as it may give rise to *hemorrhages* and *glaucoma*. Disturbances of retinal circulation and increase of intraocular pressure are, according to Wagenmann (*von Graefe's Arch.*, xxxviii., 3, p. 258) and Reimar, both dependent upon a common cause, viz., vascular alterations of the body and the eye, and microscopical examinations of glaucomatous eyes have disclosed chronic degenerative changes of the retinal vessels.

For *treatment* massage may be recommended, in transient obscurations iridectomy, and mercurial inunctions when the endarteritis is due to syphilis.

TUBERCULOUS IRITIS, WITH PARENCHYMATOUS KERATITIS.

BY DR. S. SCHULTZE, FRANKFORT-ON-THE-MAIN.

(*With two figures on Plate XI., Vol. XXXIII., Ger. Ed.*)

Abridged Translation, by Dr. WARD A. HOLDEN.

IN recent years there have been made many reports showing that parenchymatous keratitis is frequently due to tuberculosis, and in some cases pathological examinations have been made. I wish here to report a case of parenchymatous keratitis, combined with tuberculous iritis, which does not differ particularly from those hitherto described, occurring in a young man who was otherwise perfectly healthy.

A stone-worker, aged twenty, consulted me in December, 1894, stating that for several months he had suffered from an inflammation of his left eye, which appeared without any assignable cause and had not been improved by treatment. He complains of photophobia, lachrymation, and failure of vision in the left eye, which previously had been healthy, but the eye has not been painful.

St. pr. : Right eye normal. The left eye shows a moderate conjunctival and subconjunctival injection, mostly near the corneal margin ; the cornea in its lower half is diffusely opaque, with lustrous surface and no visible vessels. In the anterior chamber, occupying nearly the entire lower half, is a grayish-yellow exudation, which, in its deeper layers, appears almost purulent. The iris has undergone greenish discoloration, and the markings are obscured ; the pupil is small and is adherent to the lens by

numerous synechiæ, which atropine does not break up. The fundus cannot be seen. The tension is normal, the eye is not sensitive to pressure, the visual field is not restricted, and $V = \frac{2}{300}$.

The patient states that he is of healthy family and has always been well, except for pulmonary hemorrhages six years before, from which he quickly recovered. A physical examination failed to reveal any signs of disease except a slight dulness at the apex of the right lung. There was neither cough nor fever. Syphilis was denied. The patient was put upon mercurial inunctions, iodide of potassium, atropine, and warm moist applications. No improvement having taken place after six weeks of this treatment, subconjunctival injections of sublimate were employed, also with out benefit. The diagnosis then being confined to tuberculosis or sarcoma, the eye was enucleated March 15, 1895, and a year later the patient was still in good general health.

The enucleated ball, which was of normal size and form, was fixed in 10 % formol, hardened in alcohol, divided in half, cut in celloidin, and the sections stained with hematoxylin or carmine.

The cornea is 1 to 1.2 mm thick, *i. e.*, slightly thicker than normal; the epithelium is everywhere present, but is reduced to 2-3 rows of cells, and Bowman's membrane is normal.

Throughout the entire ground-substance of the cornea is a round-celled infiltration, the cells lying near the corneal corpuscles within the dilated lymph-spaces. This infiltration is less marked in the superficial layers of the cornea, but near the sclero-corneal margin the cells form distinct nodules (Figs. 1 and 2, Pl. xi.), although typical tubercles are not found. In the centre of the cornea there is a collection of round cells in the deep layers directly over the membrane of Descemet, which is so great that it causes a bulging of the posterior surface of the cornea and resembles a tubercle (A, Figs. 1 and 2). Besides these darkly stained round cells there are many less darkly stained, elongated, corneal corpuscles between the bundles of fibrillæ, which exceed the corneal corpuscles of the normal cornea both in size and number.

The bundles of fibrillæ show no marked changes, such as swelling, compression, suppuration, or degeneration.

New blood-vessels are found throughout the entire cornea, but in greater number near the corneal margins.

The membrane of Descemet is well preserved everywhere, but here and there it is detached from the posterior lamellæ by accumulations of round cells.

The endothelium is preserved, and appears as a single stratum of flat cells with oval nuclei, upon which lies a layer of exudation composed of round cells and coagulated fibrin. At some points the round cells are present in considerable masses, and the endothelium there has disappeared. The larger masses of these cells lie beneath the nodular infiltrations in the cornea proper. At one of these points some giant-cells are seen, and the membrane of Descemet is broken through.

Under the epithelium, at the sclero-corneal margin, there are many accumulations of round cells strongly resembling miliary tubercles, and there are many medium-sized blood-vessels surrounded by round cells.

The angle of the anterior chamber on one side in almost all of the sections is occupied by an accumulation of cells (Figs. 1 and 2, T), which extends both into the sclera and into the iris and ciliary body. It has the typical structure of tubercle, being composed in its periphery of darkly staining round cells, and in its middle portions of paler epithelioid cells, while the central portion is a caseous mass with giant-cells about it. Vessels are wanting in the tubercle. A few tubercle bacilli were found. A smaller tubercle was present at the other angle of the chamber in some sections (Fig. 1, T), and in the iris were a number of aggregations of round cells with caseation or epithelioid cells, which would seem to be tubercles at an incipient stage. The sclera and choroid, retina and optic nerve, lens and vitreous were perfectly normal.

AMAUROSIS FOLLOWING THE ENTRANCE OF A WELL AFTER THE USE OF DYNAMITE.

By L. D. BROSE, M.D., PH.D.,

OCULIST AND AURIST, ST. MARY'S HOSPITAL, EVANSVILLE, IND.

THE following instructive cases came under my observation Sept. 23, 1897 :

Christ Waller, aged forty-seven, and married, went down into a well on his farm that had gone dry, and after drilling a hole some three to four feet deep into sandstone rock, inserted therein a stick of dynamite. This failing to explode when the attempt was made, he again entered the well and drilled a second hole near the one in which the dynamite had been placed, and charged it with blasting powder which, when ignited, set off the dynamite. The drilling work was done the morning of Sept. 13, 1897, and the explosives successfully set off at about 11 o'clock in the morning the same day, after which he went to his home for dinner and then returned to the well with two men to assist him. It was about half-past one in the afternoon when he re-entered the well by means of a rope ladder, and as he descended he tried to fan out the smoke with his hat. Soon thereafter he must have lost consciousness, since he uttered no word to the men above, and upon their calling to him he made no reply. Suspecting something wrong, one of the men outside entered the well to investigate, taking the precaution, however, first to fasten a rope under his arms and leaving the end in keeping of his companion. He rapidly reached the bottom where he found Waller in a sitting posture, unconscious, and his attempts to arouse him were futile. Hastily attaching a rope around his body, the man on the outside in a few moments succeeded in withdrawing it from the well. The rescuer, by name Hartley, a

single man twenty-three years of age, then started up the ladder, but when half-way out he likewise became unconscious and fell, lodging against the sides before reaching the bottom. His body was also drawn out by the fellow-workman above. The history of the two patients, kindly furnished by Dr. W. Wilson of Yankeetown, Ind., who was called to attend them, is very similar for the next twelve hours, both continuing unconscious until near midnight, when the man Hartley, who remained in the well but a short time, regained consciousness but could not see. It was not until 10 o'clock the following night, or some thirty-two hours, before his sight returned, while his memory was confused and poor for several days. Waller, who had been in the well some twenty-five minutes, remained unconscious some eight hours longer than Hartley, and when he did become rational the discovery was made that he too was blind. On the date already mentioned Waller was brought to my office in an express wagon, the bottom of which served as an ambulance. He was so weak and pale that it required the help of two men to support him in walking. His face was very pale, and his general appearances those of one afflicted with grave anæmia. The pulse was regular and the temperature normal. The eyes rolled about, and he was incapable of fixing them upon any object or distinguishing other than between light and darkness. The pupils were semi-dilated, with a slight inequality in size, the right being a trifle the larger. They both react to light reflected upon them with the ophthalmoscopic concave mirror. It was necessary to examine the patient lying down, and because of the inability to hold the eye in fixation only an indirect ophthalmoscopic examination was possible. The optic discs were seen clearly defined but pale in color, while the arteries of the fundus in general were small and the veins prominent and distended. Neither hemorrhage nor other lesion of the retina or vitreous was found. Mentally, so far as recalling any of the circumstances connected with his affliction, his brain is a blank : in fact he only knows there is a well connected with his trouble when told so, and he is utterly incapable of locating it or recalling who the men were who assisted him in his work. Patient was taken to St. Mary's Hospital and put on iron and strychnia, the latter administered hypodermically daily, beginning with grain $\frac{1}{16}$ and increased up to grain $\frac{1}{15}$. In addition, every day for five consecutive times he was permitted to inhale the contents of a pearl of amyl nitrate.

October 2d : Patient's general condition somewhat improved. He is able to sit up alone and when assisted walks about a little, but his gait is tottering and slow. He sleeps well, is free from headache, has a good appetite, and the kidneys and bowels act normally. A direct ophthalmoscopic examination was made, disclosing a pale optic disc with clearly defined margins. The paleness of the disc was general and not confined to one portion more than to another, and in keeping with his general appearance of anæmia. The intraocular arteries seen were small, and the veins full and distended. No lesion in the retina or choroid was discovered, while the ocular tension is normal. He is able to count one or two fingers with great effort and difficulty when held just in front of either eye. More than two fingers gives rise to confusion. The eyes fix and follow in all directions an object held close in front of them although unable to define its nature. The pupils react both to light and accommodation.

October 14th : His memory continues poor and he is still unable to locate the well or relate anything of his labor or associates there. Placed in a trial frame he recognizes red, blue, and green glass. The intraocular findings, with both direct and indirect examination, the same as already reported.

November 23d : Memory a little improved, likewise his general appearance ; he has gained in flesh and improved in color. Vision still restricted to counting fingers held just in front of the eye. The strychnia injections again renewed with, internally, the elixir of phosphorus with calisaya and iron.

December 5th : Patient walks as well as usual and is fast losing his anæmic appearance. The intraocular blood-vessels appear normal when seen through the ophthalmoscope, and the optic disc is much more lifelike in color. Patient was permitted to go to his home in the country but continued under my observation, making a visit to my office every forty to sixty days. My last record dates March 4, 1899, at which time his mind is perfectly clear, and he relates clearly all the facts connected with his labor at the well and the names of those whom he employed to assist him. Physically he is above his average weight and in the full enjoyment of health. He is able to find a chair in my office, but feels his way before taking a seat. His gait is steady and devoid of weakness. The pupillary and other reflexes are normal, and with the ophthalmoscope one only sees that the temporal half of the disc is a little paler than it should be. His vision is still

restricted to counting one or two fingers held just in front of either eye, although objects held two feet away are fixed and followed in every direction of the visual field.

As to the man Hartley, who remained in the well but a short time, and who first came under my observation September 23, 1897, my record shows he had vision of $\frac{1}{8}$ in each eye and read Sn 1 well. He had wholly recovered memory and sight, and with the ophthalmoscope I could detect no trace of his temporary loss of vision. In the discharge of a stick of dynamite or blasting powder a number of gases are generated, but since the composition of these explosives, as found in the market, varies, the chemical reaction is not always the same.

In a recent article in *The Laryngoscope*,¹ by Dr. M. H. Simons, who was aboard the battle-ship *Iowa* during the various bombardments off Santiago, and while that vessel was engaged in the great naval fight, he writes of the uses and effects of the high explosive powders fired in the great guns, and states that through imperfect oxidation there is formed carbonic oxide gas, which is changed to the dioxide, carbonic acid gas, when the breech of the gun is opened. No cases of poisoning, however, by this gas came under his observation. There were developed, however, and treated, four cases of acute tonsillitis, one of acute bronchitis, and twenty-four cases of mild bronchial catarrh. In all of these there was an associated acute rhinitis, and in thirteen instances marked dulness of hearing. One case of mild conjunctivitis was likewise treated. That carbonic oxide gas is capable of producing loss of vision is corroborated by M. Schnitz, who reports two cases of poisoning by this gas in the *Annales d'oculistique*, in which vision was reduced to $\frac{1}{6}$ and only again became normal at the expiration of five months. Simeon Snell, in some "Remarks on Amblyopia from Di-Nitro-benzol,"² states that during the manufacture of these explosives and while the material is pulverized, reheated, and again cooled, a vapor is generated which is highly dangerous to persons engaged in the employment. He reports five cases of impairment of sight in the persons so engaged,

¹ Vol. vi., No. 5, May, 1899.

² *British Medical Journal*, March, 1894, No. 1731.

and gives their symptoms as follows. "A more or less complete loss of visual acuteness with concentric contraction of the visual field and at times a central color scotoma. The optic disc was pale, irregularly defined, while the retinal veins were congested. The patients upon ceasing to engage in their labors, as a rule, rapidly improved. He especially describes the general symptoms of poisoning as being manifested through the blood and nervous system. First the patients were highly anæmic, often with anæmic murmurs in the heart and larger blood-vessels, to a degree at times causing cyanosis of the mucous surfaces. A blood examination revealed many megalocytes such as are found in pernicious anæmia. The urine was markedly brown, due to some unknown aromatic substance. Second, trembling gait with great weakness in the extremities and a highly sensitive response to the effects of alcohol when administered even in small doses." I would attribute the loss of vision to an acute retrobulbar neuritis through a toxic agent that is readily taken up by the blood and exerts a highly destructive influence not only on the red blood-cells but also upon the nerve cells presiding over the highest centres of consciousness, memory and sight, as well as the bundles going to make up the optic tract and nerve itself. In none of the reported cases that have come to my notice have the memory and sight been so profoundly and so lastingly affected as in my patient Waller.

A CASE OF POISONING FROM THE USE OF ESERINE IN THE EYES.

BY CLARENCE R. DUFOUR, PHAR.D., M.D., WASHINGTON, D.C.

Mrs. N., married, white, aged thirty-five years, mother of several children, consulted me about her eyes; the main complaint being headaches, temporal and occipital. I found upon examining her eyes that she had myopic astigmatism, axes off the vertical. I deemed it best to use a mydriatic, so ordered a 3 ss of a two per cent. solution of hydrobromate of homatropine, two drops of which were to be dropped into the eyes every fifteen minutes for two hours, at the end of which time she was to come to my office. On the morning of her appointment a lady, very much excited, came into the office and asked me to come at once to see Mrs. N., who was in a house in the square below mine. She said that my treatment had been so severe, she (Mrs. N.) had fainted on her way to my office. Upon reaching the place, I found that she had become so weak and prostrated that she had fallen on the sidewalk and had been carried into a neighboring house. She was almost on the verge of collapse. Pulse weak and very slow, respiration difficult, intense pain in eyes and head, reflexes almost abolished, pupils contracted ad maximum, being no larger than a pin-point. I gave her a dose of atropine, digitalis, and nitroglycerine, and repeated it at proper intervals until she was better and was able to give me the following history :

The prescription was obtained from their druggist, a graduate of pharmacy; and upon the first instillation into the eyes a most violent pain occurred in the eyes and head. She told her husband of this pain, but he said she was nervous and imagined the pain to be severe; upon subsequent instillations the pain increased and she became weak; she continued the treatment, supposing it was all right but very severe. She could ride within three squares of

the office, and when she had gotten off the cars and tried to walk she had only been able to go one square when she fell, completely exhausted, and in the condition described. I suspected eserine poisoning from the condition of the pupils, and from the color of the few drops left in the vial, which she had with her ; they were of a faint pink color. After sending her home and explaining the case to her family physician, I saw the druggist, who admitted his mistake ; he had given her a two per cent. solution of sulphate of eserine, of which she had put two drops into the eyes eight times. In a few days she was able to come to my office and have the examination finished. I used no mydriatic in the eyes to counteract the effect of the eserine, as the atropine given internally was sufficient.

This case was so interesting and unique that I have ventured to report it.

REFRACTION IN ANCIENT TIMES.

By DR. VINCENZ FUKALA, VIENNA.

Abridged Translation by Dr. COLMAN W. CUTLER, New York.

I HAVE found in ancient literature many passages which treat of refraction and show that a number of questions were understood by the ophthalmologists of those times. Indeed, certain dioptric problems were solved which have remained unnoticed and which have been correctly answered only since 1860. Chief among these are questions regarding the cause of myopia, accommodation, and presbyopia, which have been considered achievements of recent times. Since these are not to be found in works on the history of ophthalmology, they may be given here briefly.

I. Myopia, Hippocrates (460 B.C.).

II. Aristotle explains the optical cause of presbyopia and myopia to which he first gave a Latin name (330 B.C.).

III. Albertus Magnus (1193-1280) explained the cause of myopia by a change in the position of the lens. Felix Plater (1536-1614) acquiesced in this theory.

IV. Plemp (Vopiscus Fortunatus, 1601-1671) recognized as a result of anatomical examinations the increased length of the eye as the true cause of myopia.

V. J. B. Morgagni (1681-1771) corrected Plater and Bonet (1602-1689), and by anatomical examinations demonstrated the increased length of the eye in myopia.

VI. Valsalva, Petit, and Morgagni gave as a cause of presbyopia a yellow discoloration and hardness of the nucleus of the lens.

VII. Morgagni gave a correct explanation of the mechanism of accommodation.

VIII. Janin (1776) described a second case of cataract operation on a young and highly myopic man.

IX. Eyeglasses were known probably several hundred years B.C.

The most interesting of these references is that in which Morgagni gives a correct explanation of accommodation a century and a half before Helmholtz approached the subject anew.

ON OPERATIONS WHICH INCREASE THE MOTILITY OF ARTIFICIAL EYES, AND THEIR PARTIAL REPLACEMENT BY A NEW PROTHESIS OF A PECULIAR FORM.

BY DR. HUGO WOLFF, BERLIN.

Abridged Translation by Dr. COLMAN W. CUTLER, New York.

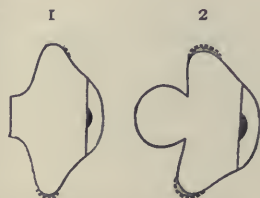
(With two figures in the text.)

THE operations which Mules proposed in 1885 and Kuhnt and Lang in 1887 (evisceration, enucleation with the insertion of a foreign body) have not been generally adopted by continental surgeons. Some are opposed to evisceration; others try to limit the indications for both operations and attempt to make eyes which would have to be removed wholly or in part, harmless by more conservative measures, such as the neurotomy optico-ciliaris, proposed by v. Graefe in 1857. As a substitute for this, since 1878 Schweigger has advised resection of the optic nerve. Scleral suture is performed at the present time in many cases, even where there is no hope of retaining vision or the form of the eyeball.

The author has found records of 383 cases of evisceration and 24 of enucleation with the insertion of a foreign body. In six cases among the former the globe which had been introduced escaped in a period of time between fourteen days and one year after the operation, and among the enucleations it fell out in two cases after ten months. No cases of sympathetic ophthalmia are mentioned, and Wolff concludes that there is little danger of such an event. The escape of the enclosed globe is due to the choice of too large

a size. Two cases are mentioned in which the result was satisfactory except for the limitation of motion.

The stump does not move ideally with the other eye because of the weight of the enclosed globe and because of the adhesions between the sclera and Tenon's capsule which follow prolonged inflammation. The stump moves better



than the prosthesis placed upon it because of the friction and especially the form of the latter. To obviate these hindrances to a freer motion of the prosthesis the author has attached it to the ball formerly introduced into Tenon's capsule, thus obtaining a better position and, because of the smaller size of the prosthesis required, greater mobility.

REFERENCES TO THE LITERATURE.

MULES. "On the Surgical, Physiological, and Aesthetic Advantages of the Artificial Vitreous Body." *British Med. Jour.*, Dec. 19, 1885; Feb. 6, 1886; *American Jour. of Ophth.*, 1887, p. 287.

KUHNT. "Ueber Enucleatio Bulbi und Substitutionsverfahren derselben." *Corresp. Bl. d. Ärztl. Verein v. Thüring.*, No. 11, Nov. 25, 1887, pp. 455-465.

L. W. FOX. "Evisceration of the Eyeball." *Med. Bulletin*, Vol. xvii., p. 221; *Jour. Am. Med. Assoc.*, Jan. 8, 1898.

H. SCHMIDT. "Exenteratio Bulbi mit Kugel Einheilung." *Klin. Monatsbl.*, 1896, p. 367.

B. CARTER. "On Removal of the Eye and Mules's Operation." *Lancet*, July 31, 1897.

R. CROSS. "Sympathetic Ophthalmitis, especially in Connection with Mules's Operation." *Lancet*, June 26, 1897.

CONJUNCTIVITIS FOLLICULOSA AND TRACHOMA.

BY DR. O. WALTER, ODESSA.

Abridged Translation by Dr. COLMAN W. CUTLER, New York.

IN recent times the interest in trachoma has increased and many attempts have been made to comprehend the still ill-defined subject. One writer speaks of follicles, another of granulations, and a third considers the tissue infiltration the essential part; and Axenfeld is quite right when he says: "There can be no chapter in ophthalmology where the number of personal opinions is so large as in that of trachoma. In the absence of certain proof of the parasitic origin of the disease, every one attempts to establish an etiological basis for his opinion, which, however, need be binding on no one else." Unfortunately such an objective attitude is not universal, and the contention about follicular conjunctivitis has led to a division into two camps: that of the dualists and that of the unitarians, in both of which objectivity is not always sufficiently observed. Professor Greeff in his recent *Studien ueber epidemische Augenkrankheiten*, says, on page 66: "First of all, the impossible unitarian standpoint must be given up." And, page 115, still more sharply: "If I look through the current literature, the specialists who adhere to the so-called unitarian standpoint, that is to say, a transformation of follicles into trachoma granules, are approaching the vanishing point. Whoever thinks in the modern scientific manner can no longer maintain this principle."

As a pupil of Rählmann, one of the leaders of the unita-

rians, who for years has given much time and labor to the study of trachoma, the author commits himself unqualifiedly to the unitarian position, and declares that he has never felt the need of setting up a disease *sui generis* in order to explain the nature of the milder forms; especially as in his trachoma material all forms of the disease are found from the mildest to the most severe.

Numerous citations are given to show that the dualists are not united among themselves in the differentiation of severe follicular conjunctivitis and mild trachoma. Saemisch says: "Follicular conjunctivitis is characterized by the development, with catarrhal symptoms, of round, pale red bodies projecting above the level of the mucous membrane, which finally disappear without leaving a trace." Saemisch calls these bodies lymph follicles, and the flat, white, roundish spots "collections of lymphoid elements," and describes them as situated, as a rule, in the fornices in parallel rows. Schweigger and Schmidt-Rimpler add nothing essential. Michel is quoted by the author as saying in his text-book, 2d ed., 1890, p. 201: "While it is possible or even probable that the same cause is at work, still two types of the disease must be recognized by their clinical course." These two forms, according to Walter, are conjunctivitis follicularis and trachoma, and Michel's description of the more severe form of follicular conjunctivitis is as follows: "The unusually swollen and hyperæmic fornix and neighboring tarsal conjunctiva, as well as that covering the caruncle, is sown with large and numerous follicles of a translucent, reddish-gray or a more opaque yellow to reddish-white appearance, from the size of a millet seed to that of a pea." Numerous quotations from the writings of Hirschberg, Kuhnt, Adamück, and others show a lack of harmony which leads the author to assume that among those who hold that the two diseases are independent, there is a lack of precision in their definition, and little agreement on certain points which are essential to their separation clinically.

The author continues: Most of the dualists acknowledge that a differential diagnosis between conjunctivitis folliculosa and conjunctivitis granulosa cannot always be made at

once. For example, Greeff states that in West Prussia, among 3025 inhabitants, there were 299 with trachoma and 390 cases designated as suspicious. So, concludes the author, Greeff could not make a diagnosis in the majority of cases, and Kuhnt's statistics show the same difficulty. When Greeff points to the ordinary diarrhœa during a cholera epidemic, or to the relation of angina with fibrinous deposit to diphtheria as an explanation or excuse for this uncertainty in diagnosis, and from this analogy concludes that follicular conjunctivitis and trachoma are separate diseases in spite of the similarity of their symptoms, there is much to say in opposition, as Walter demonstrates at some length. He then takes up the assertion that the number of those who adhere to the idea of the unity of the two forms of conjunctivitis is approaching the vanishing point, and cites a formidable number of Russian specialists who with their large opportunity for the study of trachoma, are of the same opinion as Rählmann.¹ According to Rählmann, Pick,² and Feodorow,³ the follicles may disappear entirely, leaving no trace, or they may be sclerosed, or in severe cases a superficial ulceration leads to an escape of the contents. The writer, then, and those of his faith do not believe that follicular conjunctivitis becomes trachoma, but that it already is trachoma.

From this standpoint he believes that regions said to be free from trachoma become rare, and that places should be described as having malignant or benign forms of the disease, as one speaks of malarial districts.

¹ *Græfe's Arch. f. Ophth.*, xxix., 2.

² *Arch. f. Ophth.*, xlv., 3, p. 614.

³ *Dissertat.*, Moscow, 1896; reviewed in *Centralblatt f. Augenheilkunde*, March, 1897.

THE LIGHT SENSE AND COLOR SENSE IN DISEASES OF THE RETINA, CHOROID, AND OPTIC NERVE.

BY DR. HANS KRIENES, Breslau.

Abridged Translation by Dr. COLMAN W. CUTLER, New York.

(With Plates XXII.-XXIII. of Vol. XXXIII., German Edition.)

PHYSIOLOGICAL PART.

VISION depends on the presence of certain visual substances which probably lie in the outer layers of the retina. Of these substances, visual purple is the only representative known as yet, illustrating the process of consumption and restoration peculiar to the class. They are secreted by the pigment epithelium and deposited in the rods or cones. The choroidal vessels provide nutrition and serve in their preparation.

These visual substances are chemically transformed by light into exciting substances which act on the light-conducting apparatus as stimuli which are transmitted to the visual centre where they produce sensations of light and color. The photochemical breaking up of the visual substance into substances producing the stimulus, is called by Hering dissimilation (dissociation, Donders), and the restitution of the used substances is called assimilation.

We distinguish two substances, one not yet photochemically transformed, an assimilated, or A substance, and a second, the result of the action of light on the former, a dissimilated or D substance, which acts as a stimulus to the transmitting apparatus.

Light works in two ways: it breaks up or dissociates the A substance, and as it increases in strength the dissociation is intensified, but, on the other hand, it aids and increases the process of assimilation. The assumption of such a cyclic action of light in making good on one side the loss it has caused on the other, does not seem too artificial, for if light causes in the eye an increased circulation of blood and lymph as it does in the skin, the nutrition or assimilation is aided and the products of combustion or dissociation are removed under its influence.

Light acts on the eye not only when it enters the pupil, but also when it falls on the sclera, and probably its effect on the circulation and combustion, and indirectly on assimilation, is to a large extent dependent on this latter mode. Schmidt-Rimpler has shown that if the sclera of a normal eye is moderately illuminated, the central vision is improved, but if the scleral illumination is intense, vision is depressed; ordinary, diffuse daylight, however, which strikes the eye laterally, diminishes the perception of differences as compared with that taking place when the eye is shaded (see table in original). This diminution means fatigue—that is, relatively too much dissociation. Fatigue must follow the fall of light on the sclera the more readily as there is no protection provided in this case by the advance of pigment. I believe we have paid too little attention hitherto to fatigue due to scleral illumination.

In the healthy eye, D and A are always in a state of equilibrium, since an increase in dissociation will always be compensated for by a corresponding increase of assimilation. This process by which A remains in unstable equilibrium to D is called adaptation. This state of equilibrium ends when the quantity of light reaches a certain height, for the process of assimilation has an upper limit, because the secreting power of the pigment epithelium or, in other words, the production of the visual substances cannot increase indefinitely. There is then an upper margin, at which the process of A is still able to supply the loss resulting from D.

There is then adaptation to increasing as well as to diminishing light, and a margin or limit of adaptation for

brightness. It is at this upper margin that the maximum perception of least differences is reached. If light increases beyond this point, fatigue follows, and the perception of least differences diminishes. This point is called the absolute fatigue limit where adaptation is impossible, in distinction from the zone of relative fatigue where dissociation may still be made good by assimilation.

Opposed to the upper limit of adaptation, which naturally is not a subject for ordinary examination, there corresponds the lower limit of adaptation to darkness which coincides with the threshold of perception. Fechner distinguishes between the thresholds of excitation and of least differences. The absolute threshold of excitation which is not discoverable by ordinary methods, forms the absolute limit of repair. We always determine, however, the relative threshold—that is, the least stimulus relatively to visual angle and contrast of the object seen. By repair (*Erholung*) I understand the reconstruction of the A substance so that it equals D (relative repair), or so that A exceeds D (absolute repair). In the zone of absolute fatigue D is always greater than A, in the zone of absolute repair A is always greater than D. Between these extremes lies the range of adaptation; this is composed of those degrees of light and darkness to which the eye can adapt itself, upwards and downwards. Within the limits of this range, the sensitiveness of the healthy eye remains nearly constant.

Adaptation to brightness, then, means only adaptation to increasing light, and adaptation to darkness, to diminishing light, and the degree of light at which adaptation begins is entirely secondary. The healthy eye, then, can within certain limits always renew itself by an assimilation corresponding to the dissociation.

The movement inwards of the retinal pigment during the action of light protects the visual substances in the rods or cones from too rapid and complete transformation, and regulates the change of A to D. The advance of the pigment is in relation to the quantity of light. Guglio finds that this change takes place more rapidly when the change from darkness to light is sudden, and that the advance of the pig-

ment is most marked in the central part of the retina. The return of the pigment in diminishing light takes place comparatively slowly, and in darkness, after a certain time, the pigment remains in the outermost position.

The movements of the pigment are influenced chiefly by the wave-lengths of the light, most by short-wave blue light, less by green, still less by yellow, and not at all by red light, and this corresponds to the statements of Boll and Angelucci with regard to visual purple.

The range of adaptation for monochromatic light is narrower than for white light, but the range and adaptation for the different colored lights is not the same. The sensitiveness for light of long and short wave-lengths does not increase equally in proportion to the quantity of light. With increasing intensity the sensation increases at first more rapidly, later more slowly, for blue and violet than for green, and in the same manner for green as compared with red (Nicati, Butz, Uhthoff). The maximum of sensation is reached for blue with less light than for red; with a greater intensity blue loses its specific tone, while no change is noticed in red. The maximum of sensation, then, is reached with a lower intensity in light of short wave-lengths than in that of long wave-lengths. The reverse is true in diminished light; blue is brighter, red is darker (Purkinje's phenomenon).

If color thresholds are to be determined, it is necessary to distinguish between the specific and the absolute. The specific threshold is determined by the least degree of light with which a pigment just gives an impression of color; the absolute threshold is the degree of light with which the colorless sensation of the pigment is just visible. The specific threshold is much more difficult to determine than the absolute and will always be given variably by different observers, not so much because of differences in the color sense as because of differences in experience with colors.

Both light sense and color sense are different in centre and periphery, and in this connection it is important to remember that by centre is meant the fovea and not the macula.

There follow eight tables giving the results of the author's examination of his own slightly myopic eye, in which the absolute and specific thresholds for white, gray, and colored objects of different sizes centrally and peripherally for daylight and diminished light are determined.

Among the results obtained are the following: The absolute (colorless) field for blue and the field for white are wider in the adapted eye, with diminished light, while the absolute limits for red are narrower than with daylight. With diminished light, in spite of adaptation, the specific limits are notably narrowed, the blue more than red. Colors are brightest in a zone of 10° to 15° around the fovea, but in the centre itself, even by daylight, pigments seem darker and deeper toned. This difference between the periphery and the fovea is still more marked with diminished light, the light sense and especially the blue sense being relatively lower in the latter. In other words, in the normal eye the fovea is night-blind and blue-blind as compared with the periphery. In the periphery, blue, with gradually diminishing light, passes into a neutral gray, equivalent to a mixture of 90° white with 270° black (absolute sensation). The specific sensation, however, diminishes so rapidly that while the limit of the absolute sensation—which is only slightly narrower than white—is but little contracted, there is no longer a sensation of blue in the field. The same result is obtained by the use of progressively smaller objects with a constant, moderately diminished light. In the fovea, with gradually diminished light, blue becomes darker—ultramarine, indigo, blue-black—until it passes into black, while it is still “light gray” in the periphery. As red is still recognized centrally after blue has passed into black it may be said that Purkinje's phenomenon does not exist for the fovea centralis.

If the neutral gray (90° white + 270° black) into which blue passed peripherally is taken, its peripheral limits will be the same as the absolute (colorless) limits of blue, but centrally the same gray object, while darker than it was in the periphery, is considerably lighter than the black impression produced by blue. There follows a brief discussion of the

various methods in use for testing the central and peripheral light sense, and a summary of the views of other observers, more or less conflicting. Finally allusion is made to certain other factors favoring adaptation: The pupil (Schirmer), individual differences in the position of the eyes, and the action of the lens in absorbing in proportion to its fluorescence the rays of short wave-length. If the lens is absent in an eye capable of sufficient repair of the used-up blue substance, there will be an increased blue sensation, and Widmark and Chardonnet have found in aphaxia an increase of the violet end of the spectrum, and cases of subjective blue vision following cataract operation have been reported. If, on the other hand, repair is not adequate to maintain the equilibrium between D and A, there follows an excessive consumption of the blue substance and red-yellow vision (erythropsia). A similar function belongs to the retinal pigment, and especially to the yellow pigment of the macula. Accommodation and the movements of lids and eyes, by improving the nutrition of the eye by means of increased currents of lymph and blood, also aid in the process of assimilation.

PATHOLOGICAL PART.

In affections of the optic nerve, there is nyctalopia (day blindness) and diminished perception of red; in chorio-retinitis, on the other hand, hemeralopia and depressed blue perception, both central and peripheral. The latter symptoms are characteristic also of fatigue or anæsthesia retinæ, and are symptoms of retinal inferiority, functional or organic. In order to detect slight degrees of delayed adaptation, it is necessary to determine the threshold by means of Förster's photometer, promptly, in the early stage of adaptation and again after ten or fifteen minutes' darkness, when adaptation should, in the healthy eye, be complete; five minutes is enough time, however, to enable the average healthy eye to recognize the details at the back of the photometer with the normal opening. The instrument, as Wilbrand has remarked, gives no information as to a definite part of the retina, but measures merely the total threshold. To differentiate be-

tween the different parts of the retina, the threshold must be determined in the dark room with the perimeter.

The condition of the hemeralopic eye is the same as that of the normal eye previously described, only exaggerated, as the normal fovea is hemeralopic, as has been seen. The threshold is higher in the centre than in the periphery and the threshold for blue is higher than for red. Even in daylight hemeralopic patients will often state that the central object is darker than the peripheral. Often, at the centre, blue will appear greenish and yellow reddish; bright green may seem gray, while red remains unchanged. In general, the perimetric examination, with objects of different sizes and with varying light, corresponds to Wolffberg's method, which is that a normal eye should see a blue square of seven *mm* diameter at the same distance as a red square of two *mm* diameter, except that Wolffberg measures the threshold in its relation to the visual angle, while I measure it in its relation to the degree of light. It is easier, moreover, to control the fixation with the perimeter, a matter of the first importance, as the point to be determined is the comparative sensitiveness of fovea and periphery. In the periphery, also, the blue sensation is depressed in the hemeralopic eye, the absolute or specific limits, or both, being contracted in proportion to the degree of inferiority.

[An attempt is next made to determine the threshold for different colors in a darkened room, to which daylight is admitted through a modified Aubert's diaphragm; but, as Cohn has shown, the variations of the quantity and kind of daylight are so great and so rapid that other more constant sources of light must be used to produce constant results. Moreover, the luminous intensity or light value of the colors is too uncertain and has been hitherto too difficult to determine to admit of an exact comparison. But the relations between the different findings in a given case are important and the results are compared with the known conditions of the examiner's eyes.—*Translator.*]

The results of the examination of the threshold for blue and red may be stated as follows:

1. Threshold for red not raised, for blue slightly raised,

so that both are equal, indicates slightly delayed adaptation in disease of the outer layers of the retina.

2. Both thresholds equally raised or blue higher, then red shows a more marked interference with adaptation in disease of the retina.

3. Threshold for blue not raised, but red high, shows disease of the optic nerve without disorder of adaptation.

4. Both thresholds raised, with red higher than blue, points to disease of the optic nerve complicated with disorder of adaptation.

Nyctalopia is a sign of fatigue and is characterized, aside from a lessening of the perception of differences, by the sensation of shimmering. It occurs in the normal eye following sudden changes of light as a temporary condition, and constantly when the eye is exposed to light which is beyond its limit of adaptation to brightness. Partial nyctalopia (so-called photopsia and shimmering) occurs especially in acute organic disease of retina and choroid, in the neighborhood of relative, positive scotomata, that is, of circumscribed areas which are impaired in function (Unterwerthig). Förster¹ mentions several classic examples. The shimmering area always corresponded to a defect in the field. Nyctalopia is present in other cases in the form of photopsia: "bright, transparent spots, discs, or rings, or oval figures which swing or rotate with quivering rapidity" (Förster). Nyctalopia is most marked, however, in diseases of the optic nerve. Chromatopsia, alternations of different color sensations, are symptoms of fatigue also, and are analogous to nyctalopia and shimmering, with colored lights.

Subjective color sensation is due to exhaustion of one or more of the visual materials for color; for instance, in a hemeralopic eye, those for the short wave-lengths, while the long wave-lengths are still capable of stimulation and sensation. Thus to such an eye everything appears more red or yellow than normal. In a picture gallery it is possible to distinguish the paintings of myopic artists by their warmer color-

¹ *Graefe's Arch.*, xx., 1, p. 52.

ing. Angelucci¹ in an attempt to solve the question raised by Liebreich as to the so-called senile manner of aged painters, found that among one hundred persons between sixty and eighty years of age, vision was reduced in 62.85 %; light sense in 86.1 %; in 34 % there was hemeralopia, and difficulty in recognizing violet and blue was present. Colors are seen by a hemeralope as if a yellow glass were held before the eye.

For information concerning the occurrence of anæsthesia retinæ and hemeralopia the reader is referred to the author's book, *Ueber Hemeralopie*, and the subject will be dealt with more fully in the second and third parts of the pathological division of this work. Here only a few instances are mentioned.

Spasm of accommodation may follow the same causes which produce hemeralopia—dazzling, snow blindness, “electric ophthalmia” in a case caused by lightning (*Krienes, Beiträge z. d. Verletzungen des Auges*), acute cyclitis and irido-cyclitis; or spasm occurs primarily following near work, and as a result there is anæsthesia retinæ.

It is known that during accommodation the field of vision becomes wider and during relaxation narrower, and it is clear that the circulation in the choroid is enhanced by changes of accommodation. If the ciliary muscle suffers from spasm or paresis, the nutrition suffers and with it the repair of the visual substances. We find, therefore, the symptoms of anæsthesia retinæ associated with spasm of accommodation. Müllerschein² describes a tonic spasm and one which occurs only with “the intention to see” or better a clonic spasm associated with insufficiency of accommodation. This latter form is part of the picture of nervous asthenopia which has been well described by Wilbrand,³ and which may be compared to the occupation neuroses caused by overwork, in a weakened muscle. A few cases of anæsthesia retinæ have been observed in this condition, and more would undoubtedly be recognized if adaptation were studied as has been described.

¹ “La Funzione Visiva dei Vecchi,” etc., *Arch. di Ott.*, ii., p. 3, 1894.

² “Beitr. z. Lehre d. Accommodationskrampfes,” *Inaug. Diss.*, 1888.

³ *Ueber Störungen bei functionellen Nervenleiden*, 1892.

In myopia, the chronic disturbance of nutrition of the choroïd and lack of pigment cause the same symptoms, attributed to interference with adaptation. Wolffberg and Samelsohn substantiate this view while Raehlmann claims that in myopia the field of vision for white and colors is larger than in emmetropia. [That myopia may not be accompanied by hemeralopia, even where the condition is most favorable, is shown by the case of Karl Hauer, reported by me in these ARCHIVES, vol. xxiv., No. 3, p. 316.—*Translator.*]

Then follows a description of ten cases, for the details of which the reader must be referred to the original. A brief abstract of certain of these, however, may be allowed.

CASE 2.—Anæsthesia retinæ from myopia and continued near work: An example of central fatigue, the periphery being much less affected. The field of vision with diminished light soon became as wide as by daylight, but the central threshold, especially for blue, remained much raised as compared with that of the observer.

CASE 3.—Seamstress, brunette, well nourished, not neurasthenic. Complains of dazzling, flimmering, and cloud in bright light and snow. On entering a dim room everything is dark at first, then she sees an oval red spot which lasts a few seconds and becomes bright green, lasting one or two minutes. By moving the eyes and winking, the colors disappear sooner. Work and reading quickly cause fatigue.

Myopia of 3 D and 5 D. Insufficiency of internal recti.

In this case adaptation with the photometer was delayed. In diminished light blue was seen as green when it should have been recognized, but after a period of adaptation was correctly named. With the perimeter, the limits were much narrower for blue than normal, and centrally a blue square of 2 mm was seen as black even after ten minutes' adaptation.

CASE 5.—An example of hemeralopia or anæsthesia retinæ after cataract operation; with erythropsia, etc. "D-fatigue, or excessive dissociation." $V = \frac{2}{7}\%$. Twelve days after the operation, red vision began and lasted two and one half days, becoming rose-colored and somewhat violet. Only noticed in bright places. At the same time the vision was much impaired in dim lights, the hemeralopia and erythropsia diminished and disappeared together. Eight days later the same symptoms returned for one day. During these attacks he noticed that blue objects seemed black.

The total threshold with the photometer was much raised and adaptation delayed. Blue with slightly reduced light seemed black, by daylight the blue limits were within the red. With less light, the examination with a large white square showed that the threshold was highest in the fovea, then in a macular, intermediate zone (Wilbrand), and lowest in the periphery.

Later, while there was no erythropsia, a lesser degree of anæsthesia retinæ persisted.

CASE 6.—An example of "A-fatigue," or imperfect assimilation, in contradistinction to the last case. During each of her eight pregnancies, she has suffered with hemeralopia, from the fifth month. While she at other times bears bright lights well, during these periods the sunlight and white walls and paper are dazzling. Twilight is much more agreeable. On entering a darkened room, she sees at first as through a tube. Bright objects appear reddish, but there is no green vision. One child is said to have retinitis pigmentosa. She is moderately well nourished. No albumen; six months pregnant. In the fundus there are signs of œdema of the retina. $V = \frac{2}{4} \frac{0}{0}$, and $\frac{2}{3} \frac{0}{0}$. With the photometer, after considerably prolonged adaptations (25 minutes), as compared with the normal eye, the threshold became normal. Blue was less well seen also after adaptation. The field for white was moderately narrowed. Most of all that for blue.

CASE 8.—An example of spasm of accommodation with hemeralopia, erythropsia, and chromatopsia; neurasthenia; irregular or unevenly distributed peripheral fatigue.

Max S. Age twenty-seven, photographer. Vision good until 1891. No syphilis. Ocular symptoms increased gradually until 1895; during that winter he worked excessively, facing a window opposite a white wall, and often all night. Neurasthenia developed and vision diminished; sustained work became impossible. Flimmering in daylight, dazzling (nyctalopia); hemeralopia and erythropsia. His patrons said, "He paints people's cheeks too red," and he replied, "Everyone looks so healthy."

General condition good except for neurasthenia. Pupils normal. Fundus normal. Vision, $\frac{2}{7} \frac{0}{0}$; — 6 D = $\frac{2}{3} \frac{0}{0}$. With the ophthalmoscope, My. = 1 D. V with Seggel's light sense cards by daylight and reduced light, diminished.¹

The photometer showed adaptation to be delayed and the total

¹ Krienes, "Ueber Adaptation und Adaptationsstörungen," p. 150. Festschrift zu Ehre von Professor R. Förster, 1895.

threshold raised. Blue was seen badly or not at all with diminished light. Examination of the field of vision by daylight showed a marked fatigue displacement of the Wilbrand type.¹ (Fig. 1, Plates xxii.—xxiii.)

For red 5 *mm* and blue 5 *mm* test object (Fig. 2, Plates xxii.—xxiii), both reduced blue relatively more than red. By diminished light after ten minutes' adaptation, small colored objects were not seen; the field for blue 20 *mm* was narrowed to a small area below fixation point, that for red, 20 *mm* (Figs. 3 and 4, Plates xxii.—xxiii.), being similar but extending farther upwards. After four weeks' rest and tonic treatment, and ten days in a dark room, the myopia diminished to 2.25 D. Adaptation was still delayed, but the total threshold was normal. Field for blue still narrowed, but after ten minutes' adaptation, normal. The notable features of this case are the marked spasm of accommodation with hemeralopia, followed by less spasm with anæsthesia retinæ; the improvement of the eye symptoms being independent of the continuance of the neurasthenia; the marked fatigue of the lower part of the retina, large blue and red objects being seen only downwards, by the upper part of the retina.

¹ Norris and Oliver, *System of Diseases of the Eye*, vol. ii., p. 309.

COLOBOMA OF BOTH OPTIC NERVES WITHOUT COLOBOMA OF THE UVEAL TRACT.

BY PROF. F. HOSCH, BASLE.

Abridged Translation by Dr. WARD A. HOLDEN.

(With two figures on Plate II. of Vol. XXXIV. Germ. Ed.)

AMONG the isolated colobomas of the optic nerve those are of the greatest interest in which the enlarged and excavated optic disc is surrounded by a broad scleral ring, and the retinal vessels appear in the disc already divided but arranged regularly about the centre. This is the rarest variety of coloboma of the optic nerves and only ten cases have been reported.

My patient was a very anæmic girl of eighteen who consulted me on account of myopia. She had not previously been examined by an oculist. Apart from her anæmia the patient had never been ill, and had never had trouble with her eyes. No congenital anomaly was found elsewhere in the body. Her parents were not related by blood nor were they myopic. Her brothers and sisters have good vision.

Externally the eyes appear healthy. There is no sign of strabismus, nystagmus, or photophobia. The irides are brown, the pupils of normal size and reaction. Intraocular tension normal. R: with -5 , $V = \frac{8}{200}$; L: with -2.5 , $V = \frac{4}{10}$. R. Jaeger No. 16, when held very near. L. Jaeger No. 1, at 11 cm. Color sense normal. Visual fields normal except for some enlargement of the blind spots. Media clear.

In the right eye the optic disc is enlarged to two or three times its natural diameter. It is of oval form and sharply

outlined. It is bordered by a yellowish ring $\frac{1}{2}$ Pd. in diameter, with a line of pigment at its inner margin. Upward and inward from the disc (in the inverted image) is a roughly quadrilateral area in which the retinal pigmentation is diminished. (See Plate II.)

The disc appears deeply excavated with a margin partly overhanging, and it has none of the stippled appearance usually produced by the lamina cribrosa. It has a grayish-red hue and is somewhat lighter in the centre. About this lighter centre ten to twelve small vessels emerge and extend out into the retina. Arteries cannot be distinguished from veins.

The left fundus is similar. The disc in this eye is somewhat larger and less regularly oval and its margin below is more overhanging. The light scleral ring is similar to that in the other eye, but the line of pigment representing the choroidal ring is less complete. The anomalous vessels are here about thirteen in number.

There have been differentiated three sorts of coloboma of the nerve or nerve sheaths, according to the behavior of the inferior foetal cleft in the nerve, through which the central vessels enter. 1. The cleft may not close at all, and then the central vessels will appear at the lower margin of the disc, and the latter will slope downward and backward. 2. The cleft may close in its central portion, and then the vessels may have a normal arrangement or may come out at the lower margin of the disc, but in a more regular manner and less scattered than in 1. 3. The inferior margins of the cleft may unite leaving the centre open for a time. The final result then will be a large, deeply excavated disc with a number of small vessels emerging in a circle about the centre of the disc, as in the case here recorded.

Explanation of the figures on Plate II.—Both drawings were made in the inverted image, somewhat enlarged.

PROGRESSIVE PARALYSIS OF THE LEVATOR.

BY PROF. P. SILEX, BERLIN.

Translated by Dr. MATTHIAS LANCKTON FOSTER, New York.

PROGRESSIVE paralysis of the levator is a very rare disease, which seems to be unknown to most neurologists and ophthalmologists. The only article on the subject that I have been able to find is the one by Fuchs, and although it is possible that it has been treated of by some foreign writers, I have not been able to find any reference to such an article. It has not previously been shown here in Berlin, unless I am in error, and during the past six years I have found only two cases among the 80,000 patients which have come under my observation. One of these seems to possess enough of both practical and general medical interest to be worthy of report, and possibly also this contribution may serve to direct attention to this peculiar affection and so be productive of a better knowledge regarding it.

Fuchs described five cases, two from his own practice, one each from that of Obersteiner, Kahler, and Bergmeister, and it is noteworthy that all the patients were women. In three of the cases the histories were very similar. The patients were forty-nine, fifty-six, and sixty years of age respectively, had always enjoyed good health, were non-syphilitic, had no hereditary predisposition, and the ptosis was the only physical fault to be found in their bodies. This had developed so gradually that the time when it began could not be ascertained with certainty. During the first stage of the disease the levator would lift the lid several millimetres, while the occipito-frontalis would be called upon to supplement this

action, but it slowly progressed until at length there was complete paralysis of the levator. In each of these three cases the ptosis was the more marked on the right side, and its intensity varied according to the mental condition or the physical weariness of the patient. The left eye could be sufficiently opened to permit of vision, so that only one patient carried her head thrown back in the position characteristic of ptosis. "The brow was constantly wrinkled, and the energetically raised eyebrows gave the face a comical appearance of astonishment." The lids were lengthened vertically and attenuated, partly on account of this elongation, but more as the result of an atrophy of the tissues in the neighborhood of the levator, which also produced a deep depression of the skin beneath the orbital margin.

Fuchs then described two atypical cases, both in women, one of thirty, the other of sixty years of age. The latter gave a family history of ptosis covering three generations and in six members of her family. In the other, hereditary predisposition was also present; the ptosis was present in childhood and increased in later years.

Both of my patients were women, sixty-two and sixty-eight years of age, who had never been seriously ill, were not syphilitic, had been married, had borne healthy children, felt, in spite of their age, well and cheerful, and gave no history of a hereditary predisposition. Briefly, the conditions they presented coincided in almost every point with those of the first group described by Fuchs.

The elder patient has been lost sight of for about a year, and in regard to her I will simply state that at that time her ptosis had existed about six years, and that her levators still retained some contractile power, so that the left palpebral fissure measured four millimetres, the right five.

The other, sixty-two years of age, had noticed for four years a progressive drooping of both upper eyelids, particularly of the left, until finally they could be raised in the morning only with the aid of the hands. The eyes were freely movable, and all the other organs of the body were normal. The vision of the right eye was $\frac{6}{20}$ with -4 D, that of the left eye $\frac{6}{35}$ with -2 D, a result which could be

obtained only when the head was thrown far back, a position so uncomfortable that the patient discontinued it when walking in the street or when she was in a room. The myopia dated from childhood. Medullated nerve fibres could be seen below the left papilla. When the occipito-frontalis was exerted to its utmost, the left palpebral space was scarcely three millimetres, the right four millimetres wide at its widest part, and it was doubtful if the levator retained the least activity. The stretching of the skin of the lid and the deep depression beneath the upper margin of the orbit, mentioned by Fuchs, were present, together with a condition not mentioned by him, fear on the part of the patient that she would become blind. The essential feature of the case is that in an otherwise healthy woman the levators were affected by a progressive disease which resulted in total paralysis.

This case has more than a passing interest when we consider that it may aid in answering the question whether the demonstrable changes in this disease occur as a result of a disturbed nervous influence, or are produced by a primary nutritive derangement in the muscular tissue, *i. e.*, whether the lesion is one of the nervous or of the muscular system.

The theory that a trophic neurosis dependent upon disease of the sympathetic is the cause of progressive muscular atrophy has now been abandoned. Authorities are almost equally divided in ascribing the cause of this disease to nervous and to muscular lesions. Progressive muscular atrophy certainly does not appear to be the same as progressive paralysis of the levator, because in the former the muscles of the body are involved, not simultaneously and throughout their whole extent, but singly and piecemeal, with a gradual extension over the greater part or the whole of the muscular apparatus, while in the present case only two muscles had become involved after the lapse of years. The lingering course, the frequent symmetry of the affection, the absence of a neural paralysis, the absorption of fat in the region of the muscles, and a degree of atrophy corresponding to the impairment of function, are common to both. As regards the muscular reaction of the levator to the electric current, nothing can be determined on account of its position.

Most writers are of the opinion that there are two forms of muscular atrophy, the *atrophia musculorum* or *amyotrophia spinalis progressiva* (Duchenne-Aran), and the primary progressive myopathy. Under the former name several diseases are united, such as amyotrophic lateral sclerosis, from which this case is excluded by the absence of spastic phenomena; chronic anterior poliomyelitis, an atonic, rapidly appearing muscular paralysis followed by degeneration, in which a number of muscles, such as an entire section of a limb, are always involved from the beginning; gliosis of the spinal cord, which is associated with trophic changes in the skin and changes in the sense of feeling; hypertrophic cervical pachymeningitis, in which there are prominent symptoms of irritation; caries of the lower cervical vertebræ, which, aside from any other symptoms, presents sensitiveness to pressure over the vertebræ; atrophy due to occupation and that associated with arthritis. As a result of the researches of Charcot and his followers, most authors at the present time believe that these forms of progressive muscular atrophy originate from a spinal lesion which involves the gray matter of the anterior horns, the anterior nerve roots, the nerves that supply the muscles, and the muscles themselves. Histologically, in the latter there is a diminution in the size of the fibres, a destruction of their contents, and a mass of granular and fatty material, after absorption of which there remain only sarcolemmas filled with nuclei.

In the second group, under the name of primary myopathy, or *dystrophia musculorum progressiva*, are classed nutritive disturbances dependent on idiopathic muscular disease, which cause hypertrophy, and juvenile, hereditary, and infantile atrophy. These are even yet sometimes described as separate forms of disease, but should rather be considered as a single affection on account of their clinical and anatomical unity. In this disease atrophy appears in only a part of the muscles involved, while in the balance there is a greater volume as the result of an increased growth of fat and of connective tissue. The participation of the orbicularis betrays itself by an imperfect closure of the lids, which may sometimes result in lagophthalmos. Examinations of pieces

of tissue excised from the living and from the dead body, demonstrate that an increase of the fat and of the connective tissue can occur either alone or together; sometimes fat is very plentiful between the fibres, while at other times the increase of fat is absent and there is only an abundant fibrillary connective tissue between the fibrils. As they undergo a simple progressive atrophy the muscular fibrils become thinner and more slender, until finally the sarcolemma alone remains, but it should be noted that all the primitive fibres are not equally involved. Occasional conditions which are met with are longitudinal disintegration with loss of the transverse striæ, transverse segmentation and parenchymatous cloudiness, waxy hyaline degeneration, fatty degeneration, augmentation of the muscle corpuscles, the formation of vacuoles, and frequently the occurrence of hypertrophic fibres between the atrophic ones. Although very careful observations have been made, no involvement of the ganglion cells of the anterior horns, nor of the anterior nerve roots, nor of the peripheral nerves, has as yet been demonstrated, so it is clearly evident that this group of diseases is purely muscular.

The frequent occurrence of such forms of atrophy as the simple, the fatty, the waxy, and the pigmentary, is considered by many to be characteristic of the neuropathic variety, while in primary myopathy the presence of hypertrophic muscular fibres and the striation of the muscle with connective tissue and fat is likewise thought to be characteristic, but hypertrophic fibres were found by Hitzig in spinal infantile paralysis, which is certainly of neuropathic origin; and if we study the reports of the numerous necropsies which have been made, it becomes very evident that a differential diagnosis between the neuropathic and the myopathic forms of muscular atrophy cannot be made with certainty by means of a microscopical examination of the muscle.

In this patient the history of the disease did not accord with the ordinary varieties of paralysis of the levator. The protracted course, the trace of contractility which possibly remained in the muscle, the atrophy of the skin and of the

fatty tissues, together with the circumstance mentioned by Fuchs, that in some cases there was a history of a slight degree of congenital ptosis,—all indicate that the lesion is a slowly progressive atrophy of the levator. It was therefore very desirable to obtain a portion of this muscle for examination, the more so since Fuchs says, at the end of his article, that this condition cannot be classed with any known form of muscular atrophy. Accordingly, after the patient had been placed under general anæsthesia, an incision was made through the skin beneath the supraorbital margin, the tarso-orbital fascia was divided, the muscle exposed, a portion of it elevated on two strabismus hooks and then excised. It is self-evident that this was done deep in the orbit. It occurred to me that it would be rational to suture the tendon to the stump of the muscle, but after consultation with the five or six of my colleagues who were present, I abandoned the idea, removed an oval piece of skin from the lid, united the margins of the wound, and obtained a result with which the woman is still greatly pleased. There was no reaction after the operation.

Macroscopically there was nothing especial to be noticed about the muscle. The color was the same as that usually seen in the other eye-muscles, and as to its size, lack of experience in viewing the levator in the orbit of a living subject renders me unable to state whether it was broad or narrow.

The excised portion of the levator was hardened in Müller's fluid and in a solution of picric acid and corrosive sublimate, stained with hæmatoxylin and eosin, and examined, partly in this condition, partly unstained in glycerin. The examination showed :

1. A marked striation of the muscle with fat and connective tissue.
2. Rarely a good transverse striation of the muscular fibres, but frequently, instead of this, a fine longitudinal striation, and often a finely granular degeneration.
3. Great differences in the breadth of the fibres, which varied from six to one hundred and ten microns. The broad for the most part outnumbered the narrow fibres,

and the different ones were separated by abundant connective and fat tissue. The nuclei were not extremely, but yet decidedly, augmented, as compared with those of the normal muscle fibres, and they varied considerably in form: some were egg-shaped, some spindle-shaped, some large, and some small.

The contractile substance was often fragmentary, and presented clefts and fissures, so that here and there the empty sarcolemma alone remained. On transverse section a space filled with serum occasionally appeared between the shrivelled muscle fibres and the sarcolemma. Large accumulations of red-blood corpuscles in the loose connective tissue between the muscle fibres were probably due to hemorrhages caused by the excision.

In order to determine how far these conditions are to be considered pathological, portions of normal levators taken from individuals of eighteen, forty, and seventy-five years of age were examined. This examination showed that:

1. In the eighteen-year-old girl, the muscle fibres lay close together, were from ten to twenty microns broad, the visual field of a Zeiss D. Ocul. II. contained about twenty when placed longitudinally; the nuclei were scanty, moderately large, and egg-shaped.

2. In the forty-year-old man, the fibres were from fifteen to thirty microns broad, the visual field contained about fifteen fibres, and the nuclei were somewhat more numerous than in No. 1.

3. In the seventy-five-year-old man, the breadth of the fibres was from seven to fifteen microns, the visual field contained about thirty fibres, and the nuclei were more numerous than in Nos. 1 and 2.

In all three the fibres were clearly marked transversely, and the intermuscular connective-tissue was very slight.

While the result of the examination of this case of atrophy agrees partially with that published by Fuchs, it differs in these important particulars: he did not find any hypertrophic fibres the diameter of which greatly exceeded thirty microns, or any considerable increase of the connective tissue, or the permeation of the muscle with fat, and I did

not see the pigment mentioned by him, unless it may have been in the blood clot. In all other respects our observations agree.

What conclusions are we entitled to draw? Like Fuchs, I think that we have to deal with a primary atrophy of the levator, but I cannot agree with him that it is not to be included among the known forms of muscular atrophy. At the time of its removal he could not positively declare that the portion he excised was a part of the muscle; he cut out a little bit from a strong cord which he found extending forward, and perhaps the examination of a larger piece of muscle would have given him different results, but then again perhaps not. It may be that he is right in his opinion; further researches will determine that, but I think that this is a primary myopathy, *dystrophia musculorum progressiva*, for the histological condition I found is almost exactly the same as that of this disease as it has been described many times by neurologists, and since they have been unable to prove the presence of nerve lesions in numerous diseases of the muscles of the body, we need not fear to fail to do so in an isolated case of degeneration of a muscle of the eye. It is right to ignore for the present the fact that by means of a more perfect technique changes in the nervous system may, at some future time, be proven to be present in the so-called myopathic degeneration.

One is apt to conceive of this disease as a special form of congenital ptosis, particularly in those cases in which its beginning is said to have occurred in youth, and to think that the muscular trouble may present the first traces of the hereditary form of muscular atrophy; but the limitation of the disease to the levator is opposed to this view, because such a limitation does not occur in any other form of muscular atrophy, and in addition the histological condition is not the same as in congenital ptosis.

I had an opportunity to examine a portion of a levator taken from a twenty-seven-year-old woman upon whom I performed Panas's operation for congenital ptosis in January, 1895. She returned in March, 1896, with the lid greatly enlarged and drooping so that the globe could not be seen.

The freely movable, apparently normal skin covered a tumor about as large as a pigeon's egg, of irregular shape and soft consistence, which was at first thought to be a lipoma, but proved to be a cyst with pulpy, in places honey-like, contents, and with a very delicate wall of cellular tissue covered with two or three layers of pavement epithelium. This case is interesting on account of the peculiar outcome of Panas's operation, which up to the present time is unique and because, as the cyst was developed from a hair follicle, it furnishes positive proof of the existence of hairs in the skin of the upper eyelid, a fact which has been disputed, but which I have repeatedly demonstrated on patients who had been operated on by others for entropion by the transplantation of flaps, either with or without pedicles, and who have later applied to me for relief from the irritation of the cornea by the little hairs in the beautifully healed flaps. Together with the cyst I removed a piece of the levator, a proceeding I believed to be justifiable because no trace of functional activity could be detected in the muscle. A portion of the skin of the lid was removed at the same time, which gave a cosmetic result satisfactory to the patient.

The microscopical examination of this muscle showed a uniform atrophy. The fibres were in a state of total connective-tissue degeneration, transverse striæ could not be found, the nuclei were numerous, spindle-shaped, and interspersed with fat and connective tissue.

As the conditions found in progressive paralysis of the levator and in congenital ptosis are so essentially different, it may be well to study them in connection with each other, especially with regard to the cases in which heredity and the beginning of isolated progressive paralysis in childhood has been established. Gowers, speaking of congenital ptosis, says that a slight double ptosis sometimes occurs in several members of the same family, that this may appear after the age of puberty, and that a slight double ptosis sometimes appears in middle age in neurasthenic individuals. Goldzieher saw a double ptosis develop in a healthy individual, and thought that it might be due to disease of the levator. Ptosis happens from paralysis of the sympathetic, trauma-

tism, and hysteria, but the form of most interest is the congenital, and whether this is due to an absence, a faulty development, or an atrophy of the levator, or to a nuclear disease in the oculomotorius, is a question which still awaits an answer. Probably the cause is not always the same. Siemerling found changes in the oculomotor region in congenital ptosis, but their situation did not agree with the centres claimed by others for the levator, which is placed by one in the most anterior part, by another in Westfall's group, and by a third at the distal end of the oculomotor nucleus. Kölliker and Bernheimer could discover no anatomical lesion which corresponded with the clinical and physiological condition, and Bach could find no changes in his experiments regarding the extirpation of the muscles of the eye, or post mortem in a case of congenital, hereditary ptosis.

Sometimes the muscle is badly developed, and then it acts though to a very limited degree. If the lid is slightly raised when the eye is turned upward, it may have been through the connection between the superior rectus and the levator; but if it is raised in the absence of any such associated movement of the eye, the ptosis must be due to weakness of the levator, and the oculomotor nucleus must be intact. If the lid remains immovable, the muscle may be wanting, may be atrophic, or changes may have occurred in the nuclear region. A combination of these conditions is possible and we are usually not in a position to make the diagnosis clinically, but this is certain, that a muscular degeneration occurs, both with no observable change in the nervous system and also in consequence of such a change. The first is a primary atrophy, the second is secondary from central lesions.

Bilateral paralyses of the levators alone have been met with in tabes and progressive paralysis, as in the case reported by Dujardin, but usually other muscles, as the superior rectus and the inferior oblique, are simultaneously affected. A minute nuclear lesion may affect a single muscle, as in ophthalmoplegia interna, but usually through extension of the lesion other muscles become involved, as is the rule in peripheral paralysis, and that sometimes in ophthalmo-

plegia interna there is no extension of the paralysis is explained by the isolated blood-supply of the nuclear field.

In this case a peripheral paralysis is excluded by the absence of involvement of other muscles, a central paralysis by the fact that isolated nuclear paralysees appear suddenly or in a brief space of time, while all of these patients state that the ptosis came on very gradually, in the course of years. To maintain the neuropathic theory it must be assumed that on each side the groups of ganglion cells pertaining to the levator alone were destroyed in the slowest conceivable manner, and that this process spared all of the neighboring cells. This is very improbable, particularly as experience teaches that the levators are the least involved in ophthalmoplegia, so that often when the eyes are immovable there is only a moderate degree of ptosis. I therefore agree with Fuchs in the belief that this is a primary muscular degeneration, but instead of holding it to be *sui generis*, consider it a myopathic form of progressive muscular atrophy.

LITERATURE.

SCHULTZE, *Ueber den mit Hypertrophie verbundenen progressiven Muskelschwund und ähnliche Krankheitsformen*, Wiesbaden, 1886.

GOWERS, *A Manual of Diseases of the Nervous System*, vol. ii., p. 187.

EULENBERG, *Nervenkrankheiten*, 2 Theil, 1878.

FRIEDRICH, *Ueber progressive Muskelatrophie*, Berlin, 1873.

OPPENHEIM, *Lehrbuch der Nervenkrankheiten*, Berlin, 1894.

EULENBERG, *Realencyclopädie der ges. Heilkunde*, Bd. xiii., 1888.

SEELIGMULLER, *Krankheiten der peripherischen Nerven*, Braunschweig, 1882.

FUCHS, E., "Ueber isolirte doppelseitige Ptosis," *Arch. f. Ophth.*, xxxvi., 1, p. 235.

FUCHS, *Wien. klin. Wochenschrift*, 1890, p. 13.

GOLDZIEHER, *Centralbl. f. Augenheilk.*, 1890, p. 94.

DUJARDIN, "Ptosis bilateral isole," *Jour. d. sci. méd.*, Lille, 1884, p. 16.

HITZIG, *Berl. klin. Wochens.*, 1889, p. 629.

ERB, "Dystrophia muscularis progressiva," *Deutsch. Arch. f. klin. Med.*, Bd. xxxiv., 1884.

LETULP, "Zur Lehre von der Lage und der Function der einzelnen Zellgruppen des Oculomotoriuskernes," *Arch. f. Ophth.*, xli., Abth. 2.

SIEMERLING, "Anatomischer Befund bei einseitiger congenitaler Ptosis," *Arch. f. Psychiatrie u. Nervenheilk.*, Bd. xxiii., p. 764.

BACH, L., "Anatomischer Befund eines doppelseitigen angeborenen Kryptophthalmus beim Kaninchen nebst Bemerkungen über das Oculomotorius kerngebiet," *Arch. f. Augenh.*, Bd. xxxii., 1, p. 17.

REPORT OF THE TRANSACTIONS OF THE SECTION
IN OPHTHALMOLOGY AND OTOTOLOGY OF THE
NEW YORK ACADEMY OF MEDICINE, APRIL 17,
1899.

By DR. J. HERBERT CLAIBORNE, Secretary.

OPHTHALMOLOGICAL PART OF THE MEETING.

THE PRESIDENT, DR. PETER A. CALLAN, IN THE CHAIR.

The evening was devoted to the presentation of clinical material, and to a paper on the **use of the extract of the suprarenal capsule** in the diseases of the eye.

Dr. R. DENIG presented a case of **traumatic enophthalmos** caused by a pistol-shot. Radiographs were taken with difficulty, owing to the copious salivary flow and enormous swelling of left palate. The bullet pierced the right orbit transversely, cut the optic nerve, producing hemorrhages and choroidal rupture, penetrated the left antrum of Highmore, and was finally arrested in the pterygoid process, whence it was removed with difficulty. Dr. Denig said that while the bullet wounds in the orbit were not rare, cases of enophthalmos in connection with them were rare. We would expect to meet more cases of enophthalmos in such wounds.

Dr. PERCY FRIDENBERG spoke of some of the vessels going from the disc as being of normal calibre, and he thought this hardly possible unless the bullet had struck the nerve back of entrance of the central retinal vessels. He referred to a case in which he had used Roentgen rays.

The chairman referred to a case in which the autopsy showed that the bullet had not injured the nerves. He thought that hemorrhage into the orbit or fracture of the foramen opticum might cause similar ophthalmoscopic appearances.

Dr. E. GRUENING referred to a case of his in which the cutting of the nerve had taken place back of the entrance of the central vessels. Arteries and veins all looked normal.

Dr. H. KNAPP showed a patient in whom there was **complete restoration of sight after an operation by the Haab magnet.** The injury occurred in August, 1898. Two days after there was a scar in the cornea, and the track of the foreign body through the lens was visible. But the foreign body had disappeared in the vitreous humor. The Haab magnet having been applied, the foreign body was drawn forward, and the iris bulged. The foreign body was extracted with the magnet through a corneal section. Now the only thing visible is the perforation in the iris from the foreign body. The lens has cleared up, and the patient reads $\frac{2}{0}$ with $+ 2$ D.

Dr. THOMAS R. POOLEY referred to the remarkable result: the clearing up of the lens in Dr. Knapp's case.

Dr. GRUENING said it was not infrequent that the partial cataract, which occurs as a result of touching the lens in glaucoma operations, clears up.

Dr. FRIDENBERG also spoke of a case of foreign body in the lens which did not cause any further opacification than that produced directly by itself.

The Chairman congratulated Dr. Knapp on his good result. The best result in his experience had been $\frac{2}{0}$; but the visual acuteness afterward became less.

Dr. KNAPP spoke of the clearing up of the rabbit's lens in ruptures after experimental wounds. He also spoke of the method of drawing the foreign body to the posterior pole of the lens, and then leading it around the periphery. He had tried this six times. He did not succeed in one case.

Dr. JULIUS WOLFF presented two cases of **congenital paralysis of one external rectus with retraction and protrusion movements of the eyeball.**

In his first case, a girl of nineteen, with weak mental and physical development, who suffered from headaches and hysteria, showed divergence of right eye of 15° or 20° . The eye could not be abducted. In attempted adduction, the right eye recedes into the orbit about 8 mm, and turns upward. The upper lid, lacking support, falls, so that the eye is almost closed. In attempted abduction, the eye moves forward, thus widening the palpebral fissure.

In the second case, a boy of five and a half presented a similar but less pronounced condition. Outward rotation beyond the middle line was impossible, inward rotation was much restricted, and accompanied by moderate retraction of eyeball and falling of upper lid.

In both cases the condition was congenital.

The cases will be published in detail in these ARCHIVES.

Dr. MARPLE presented a case of **congenital muscular anomaly** in a boy of twelve years of age. The head was always bent forward and to the left, as shown in a photograph taken at six years of age. Discussed by Drs. SEABROOKE and VALK.

Dr. T. R. CHAMBERS presented a case of **plastic operation for removal of a solid tumor at the inner canthus of the eye.**

Dr. E. GRUENING detailed the clinical history of a case of **corneal wound of the eyeball followed by sympathetic ophthalmia.** Dr. W. B. MARPLE gave the anatomical demonstration of the same case. Dr. GRUENING said the case was recorded because it proved that a purely corneal wound, with extensive prolapse of the iris, can under so-called conservative treatment induce sympathetic ophthalmia. He thought this termination would in all probability have been avoided by a timely excision of the prolapsed iris. The left eye of a child had been struck by a piece of glass, producing an incised wound of the cornea extending across the horizontal meridian. The iris was prolapsed in the entire extent of the wound. Excision of the prolapsed iris was suggested, but was refused by the parents. Atropine and a bandage were employed. Twenty-three days after the injury both eyes were affected, and the child saw badly. The cornea of the injured eye was hazy, the anterior chamber abolished, and pupil filled with exudation. The right eye was the seat of plastic irido-cyclitis. The cornea was clear, the pupil free, the iris discolored and immovable. The child was too restless for a view of the fundus. Dr. Gruening made an incision at the lower limbus of the cornea, and attempted to tear the iris away from the corneal wound. This was unsuccessful. The left eye was finally enucleated. The right eye was much damaged, and at the end of four months possessed visual acuteness of $\frac{1}{16}$. Dr. Marple's anatomical specimens showed that the incarceration of the iris had flattened the ciliary processes, lengthened the ciliary body, and drawn it into the anterior chamber.

Dr. POOLEY said the case only bore out the position taken by him in the recent discussion, viz., that freeing the iris in these cases was the proper procedure. He thought it useless to remove the injured eye after sympathetic ophthalmia has begun in the second eye. Dr. H. KNAPP said the case interested him very much as he had seen it a few days before enucleation. He said if the iris was not lacerated in this case it would be the first case in his experience in which sympathetic ophthalmia followed simple prolapse from corneal wound. He wished to know if the iris was lacerated. He had seen hundreds of such cases without sympathetic ophthalmia. He thought more evidence should be collected in order to reach a positive conclusion.

Dr. H. H. SEABROOKE referred to two cases—one of incarceration of iris. In this case there was sympathetic ophthalmia and both eyes were lost; another case: the injury was from a fire-cracker; there was prolapse. Several weeks afterward sympathetic ophthalmia resulted. The exciting eye had an attack of glaucoma. He had still another case in which the eye was enucleated two weeks after injury. Two years afterward sympathetic ophthalmia occurred.

Dr. KNAPP referred to the greater frequency of sympathetic ophthalmia after the combined than after the simple extraction of cataract.

Dr. W. H. BATES read a paper on the **use of the extract of the suprarenal capsule in diseases of the eye** (published in this volume of these ARCHIVES, No. 3).

In the *discussion* of this paper Dr. CHAMBERS wished to know the strength of the solution and how long it keeps. Dr. BATES replied that the strength was 1-10, and that if kept cold it would keep a long while.

Dr. J. O. TANSLEY had used it in the nose a good deal during the past year. He had also used it to get wax out of the ear. He had used it successfully in a case of acute catarrhal inflammation of the eye, after the use of ice applications. The discussion was closed by Dr. BATES.

MAY 15, 1899.

THE PRESIDENT, DR. PETER A. CALLAN, IN THE CHAIR.

The evening was devoted to the presentation of clinical material—cases and specimens—and to a paper on **strabismus**.

Dr. ARNOLD KNAPP showed five specimens of eyes enucleated

after **subchoroidal hemorrhage**. The specimens were imbedded in glycerine jelly and demonstrated clearly the pathological conditions in each eye. He divided them into three classes: 1st, those that followed extraction of the lens; 2d, those that occurred in irido-cyclitis and glaucoma—there were two cases of this kind; and, 3d, those that followed violence, such as gouging.

Dr. J. GUTTMAN demonstrated a case of **intraorbital abscess due to empyema of the antrum of Highmore**.

The case was that of a child, five years old, who was seen four weeks before. The temperature was 104°. The left cheek and both lids of the left eye were swollen. There were proptosis and chemosis. The pupil was grayish and reacted to light, but fundus could not be seen. Dr. Guttman said that he consulted an eye surgeon who diagnosed thrombosis of the orbital veins and made a fatal prognosis. The left nostril was filled with pus and the two bicuspid teeth were carious. The two teeth were extracted but no pus escaped. The antrum was then opened and an ounce of foul-smelling pus escaped. He curetted the antrum and found necrosis there. The next day the temperature fell and patient could see. He made an incision at the inner corner of the eye, extending to bridge of nose, and found the ethmoidal cells and the perpendicular plate of the ethmoid necrosed. There was good communication between orbit and nose.

Dr. Guttman thought that the origin of the condition lay in the carious teeth because the mother stated that the child first complained of pain in the teeth. From the antrum the pus then escaped into the orbit, the ethmoidal and the sphenoidal cells. He found the whole orbit full of pus.

Dr. H. KNAPP thought the disease started in the frontal sinus. He had seen such cases.

Dr. POOLEY was inclined to think that the case was originally one of sarcoma of the antrum and he thought that sarcoma cells should be looked for.

Dr. JOHNSON agreed with Dr. Pooley.

Dr. T. R. POOLEY described a case of **herpes zoster ophthalmicus**. The patient was not present. The case, he thought, was typical. The cicatrices were very deep. The cornea was involved as was usual when the nasal branch of the nerve was affected and often the keratitis was parenchymatous.

Dr. WM. M. LESZYNSKY spoke of a case of herpes zoster and

said the condition was due to acute degenerative neuritis of the supraorbital nerves, in which the analgesia and neuralgia had persisted for a year. He compared herpes in this region with the herpes intercostalis and said there was rarely, if ever, such evidence of neuritis in the intercostal form.

Dr. POOLEY said it was due to inflammation of the nerve in the branches or at the Gasserian ganglion.

Dr. CHAS. H. MAY showed a case of **injury to an eye with loss of lens, entire iris, and exposure of ciliary processes.** One year ago a young man received a perforating wound of the cornea from a nail. The iris was torn entirely away, the lens was extruded, there was loss of vitreous, and the eye collapsed. The ciliary processes were clearly exposed and were apparently drawn forward. There was a central opacity to which the ciliary processes seemed attached by inflammatory products.

Dr. POOLEY asked if Dr. May was certain that there was no lens substance remaining. He thought the opacity in the centre might be due to remaining lens matter.

Dr. MAY replied that he had not seen the lens and so was not certain it had been lost, but in view of the extreme damage done by the accident he thought it very probable none of it remained any longer in the eye. He thought the white scar to which the ciliary processes were attached was largely due to opaque capsule.

Dr. ARNOLD KNAPP again demonstrated one of his specimens which showed the extensive changes wrought in the eye by gouging. Both iris and lens were lost. He thought the specimen particularly interesting in view of Dr. May's case.

Dr. T. R. POOLEY showed a case of **van Fleet's modification of Panas's operation for ptosis.** Dr. Pooley showed the case for Dr. GEO. A. TAYLOR, who had done the operation. The result was excellent. The case was discussed by Dr. H. KNAPP, Dr. FRANK, and Dr. MATTHIAS L. FOSTER.

Dr. H. KNAPP made some remarks in regard to **injecting physiological saline solution into eyes that collapse after operation,** and demonstrated a patient. The remarks were published in this volume of these ARCHIVES, No. 3, p. 300.

Discussion: Dr. T. R. POOLEY had seen the case of cholesteroline crystals and thought the result marvellous.

Dr. FRANCIS VALK read a paper entitled **strabismus: a theory and treatment.** After stating the different theories as advanced by Donders, Priestley Smith, Hansen Grut, Walfors,

and others, in which he claimed they placed all the cases of squint in nearly the same class, the writer proceeded to advance his own views. His observations were based on one hundred and thirty cases noted since he came to his present conclusions. He divided squint into two great classes:

1. Those with congenital amblyopia, vision always being less than $\frac{2}{100}$, with the loss of the fusion power in the amblyopic eye, so that the eye turns in the direction of the more powerful lateral muscle, generally inward.

2. Those with a refractive error of some kind, or possibly emmetropia. In these cases an antecedent anomaly of the muscles exists. In this class is found the amblyopia ex anopsia.

In operating he was accustomed in the first class to take a "tuck" in the over-strong muscle with catgut sutures and before they are tied to cut the opposing muscle from its scleral insertion.

In the second class he urged the exact estimation of the refraction and its correction before any operation is attempted.

In case of an operation being necessary he advised a single tenotomy or an advancement according to the necessities of the case.

He demonstrated several cases illustrative of his method of operating.

Discussion: Dr. T. R. POOLEY said he had no remarks to make about the theory Dr. Valk had set forth. But he said he thought the case in which Dr. Valk had tenotomized the internal rectus and had "tucked" the external would surely result in divergence. He was opposed to any method that reduced the motility of the muscles below their normal limits.

Dr. VALK thought he had enough experience to support his views. He did not think any bad result likely to result from tucking or doubling the muscle. The cases for each operation must be carefully selected.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE FIRST
QUARTER OF THE YEAR 1899.

BY DR. ST. BERNHEIMER, IN VIENNA ; DR. O. BRECHT,
PROF. R. GREEFF, PROF. C. HORSTMANN, AND PROF.
P. SILEX, IN BERLIN ;

WITH THE ASSISTANCE OF

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Stockholm ; Dr. HERRNHEISER, Prague ; Prof. HIRSCHMANN, Char-
kow ; Dr. KRAHNSTÖVER, Rome ; Dr. P. VON MITTELSTÄDT,
Metz ; Prof. DA GAMA PINTO, Lisbon ; Dr. RICH-
ARD SCHWEIGGER, Berlin ; Dr. SULZER,
Paris ; Dr. L. WERNER, Dublin ;
Dr. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

Sections I.-III. Reviewed by PROF. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

631. ROLLES. *Traité d'ophtalmoscopie*. Paris, Masson, 1899.
632. OELLER. *Atlas des Ophtalmoskopie*. Part v. 15 plates
with text. Wiesbaden, 1899. Lehmann.
633. WILM. The ophthalmology of Alkoatim (1159). Part
ii. *Inaug. Dissert.* Berlin, 1899.
634. WAGENMANN. The new grand ducal eye clinic at Jena.
Weimar, 1899.
635. WICHERKIEWICZ. Reports from the eye clinic of the
Jagellon University at Cracow, 1898.
636. WICHERKIEWICZ. The university eye clinic at Cracow
in 1896-1897. 1898.
637. HAAS. 33d report of the charitable eye institute in

Rotterdam, for 1898. (5054 patients, 247 in-patients, 55 cataract operations.)

638. BOUVIN. 9th report of the eye institute at Gravenhagen, for 1898. (4146 patients, 220 in-patients, 23 cataract operations.)

639. MULDER. 6th annual report of the eye clinic at Groningen, for 1898. (1762 patients, 154 in-patients, 30 cataract operations.)

640. VAN MOLL. Report of the eye clinic in Amsterdam, for 1898. (2939 patients, 190 in-patients, 69 cataract operations.)

641. GUNNING. Report of the eye clinic in Amsterdam, for 1898. (12,244 patients, 257 in-patients, 27 cataract operations.)

642. MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY. 73d annual report, 1898.

643. MANHATTAN EYE AND EAR HOSPITAL. 29th annual report, 1898.

644. BROOKLYN EYE AND EAR HOSPITAL. 30th annual report, 1898.

645. NEW YORK OPHTHALMIC AND AURAL INSTITUTE. 29th annual report, for the year ending Sept. 30, 1898.

646. BERGER. The ophthalmology (*Liber de Oculo*) of Petrus Hispanus. Munich, 1899. Lehmann.

The fifth part of OELLER'S (632) atlas concludes the regular undertaking. A supplementary part containing ophthalmoscopic rarities will appear soon.

WILM'S (633) dissertation is a continuation of Jelsch's, which appeared in 1898, and contains a translation of the ophthalmology of Alkoatim.

WICHERKIEWICZ'S (635) reports from the Cracow clinic form a book of one hundred pages containing statistics as to patients, scientific articles by various authors (which will be reviewed elsewhere), and a detailed description of the new luxurious clinic.

73d annual report for 1898. There were treated at the out-patient department of the Mass. Charitable Eye and Ear Infirmary (642) during the year 1898, 15,486 new eye patients. There were admitted to the wards 1096 eye patients. The usual carefully prepared table showing the results of cataract extractions is given, from which we learn that there were 140 extractions in all. Gräfe, 46; simple, 38; simple with buttonhole in iris, 31; cata-

ract other than senile, 25. Of the 38 simple extractions only 4 had a result below 0.1. Of the 30 "buttonholes," 2 had results below 0.1, and of the 46 Gräfes, 4 had less than 0.1.

BURNETT.

The number of eye patients treated at the Manhattan Eye and Ear Hospital (643) during the year 1898 was 12,996. There were 56 extractions with iridectomy and 41 simple.

BURNETT.

The number of new patients treated in the Eye Department of the Brooklyn Eye and Ear Hospital (644) during 1898 was 10,571. There were 6 extractions with iridectomy and 10 simple.

BURNETT.

During the year there were treated at the New York Ophthalmic and Aural Institute (645) 9029 new eye patients in the Dispensary Department, and 468 in the Hospital. There were 618 operations performed on the eye, of which 123 were simple extraction of mature senile uncomplicated cataract and 5 with iridectomy; on the whole, 216 operations for cataract.

BURNETT.

BERGER (646) has collected the *Liber de Oculo* of Petrus Hispanus, Petër of Lisbon, later, Pope John XXI. (1276-1277), from manuscripts in the libraries of Munich, Florence, Paris, and Rome. The whole furnishes an interesting picture of the state of ophthalmology in the middle ages.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

647. MORAX. Remarks on Weichselbaum and Müller's article: On the Koch-Weeks bacillus of acute conjunctivitis. *Graefe's Arch.*, xlvii., p. 662.

648. MORAX. Experimental researches on the bacillus of acute contagious conjunctivitis (Weeks bacillus). *Ann. d'ocul.*, cxxi., p. 42.

649. VALUDE. Sponge-grafting in the capsule of Tenon. *Ibid.*, p. 38.

650. BULLOT and LOR. On the effect of the corneal epithelium on the state of the endothelium and the corneal stroma in transplanted eyes. *Ibid.*, p. 52.

651. LODATO. On the ocular changes due to inanition. *Arch. di Ottalm.*, v., p. 286.

652. HILBERT. Products of foetal inflammation in one eye,

coloboma and amblyopia in the other. *Zehender's klin. Monatsbl.*, xxxvii., p. 122.

653. VAN DUYSSE. Aplasia of the optic nerve and "macular" coloboma in a cyclopic eye. *Arch. d'ophth.* xix., 1, p. 25, and 2, p. 106.

654. CLUZET. A new explanation of the pupillary shadow. *Arch. d'ophth.*, xix., 3, p. 187.

655. DREYER-DICTFR. On the diagnostic value of the ophthalmoscopic stigmata of degeneration. *Ann. d'ocul.*, cxxi., p. 46.

656. HAUENSCHILD. On antisepsis and asepsis in operations on the ball, with remarks on the after-treatment of cataract patients. *Zeitschr. f. Augenheilk.*, 1, p. 227.

657. ULRY and FRÉGALS. Experimental researches on the penetration into the eye of collyria containing iodide of potassium. *Arch. d'ophth.*, xix., 1, p. 1, and 3, p. 159.

658. TORNATOLA and ALESSANDRO. Subconjunctival injections of chloride of sodium. *Arch. di Ottalm.*, v., p. 92.

659. LICHERER. Investigations on the sterilization of India ink for tattooing the cornea. *Arch. f. Augenheilk.*, xxxix., p. 22.

660. GÜNSBERG. On suturing penetrating wounds of the cornea. *Wjest. ophth.*, 1899, No. 1.

661. BEARD. Exophthalmic goitre attended by rapid increase in myopia occurring in an elderly subject. *Amer. Journ. of Ophth.*, Feb., 1899.

662. MORTON. Simple enucleation not a proper surgical procedure. *Annals of Ophth.*, Jan., 1899.

663. BRUNS. A microphthalmic family. *Amer. Jour. of Ophth.*, Mar., 1899.

In order to correct an erroneous statement by Weichselbaum and Müller, MORAX (647) presented to the Paris Ophthalmological Society pure cultures of the Weeks bacillus on serum-agar. The colonies are punctate and transparent. The bacillus grows also in serum bouillon, which it renders slightly cloudy. From a culture made two years ago, Morax has grown successive colonies, inoculating ascites-agar weekly; in this time there has been no change in the bacillus. For the animal organism the Weeks bacillus is not pathogenic and infection does not take place.

SULZER.

VALUDE (649) presented to the Paris Ophthalmological So-

ciety a patient, into whose capsule of Tenon, after enucleation of the eye, he had inserted a piece of sponge, with the intention of securing greater mobility in the artificial eye. A year after the operation the stump had shrunk to a third of its original volume.

In the discussion, Billot remarked that Cornil had shown by experiments on animals that sponge grafted into the liver was quickly absorbed. SULZER.

BULLOT and LOR (650) placed rabbits' eyes in the abdominal cavities of the animals. Twenty-four hours later they found the corneas œdematous, twice as thick as the normal, and deprived of their endothelium. These changes were brought about only when the epithelial layers remained intact. If this were removed the corneal layers remained clear and did not swell, and the endothelium remained intact. When a small area only was denuded of epithelium, the corresponding portion of the cornea remained clear, while the remainder became swollen. SULZER.

LODATO (651) examined the eyes of dogs which were allowed to die from starvation or from starvation and the lack of water. Before death he found slow pupillary reaction, white discs, small retinal arteries, and large veins.

The histological changes involved almost all tissues of the eye. The cornea endothelium and the pars ciliaris retinae and the retinal pigment epithelium were degenerated, the iris was thin and anæmic, and the inner layers of the retina were œdematous. No atrophic changes were found in the optic nerves.

KRAHNSTÖVER.

CLUZET (654) explains the shadow test by means of two simple experiments. Before a sheet of paper representing the fundus is placed a convex lens at a shorter distance than its focal distance. If now a piece of black paper is moved over the white background, as seen through the lens, the shadow moves in the same or the opposite direction according as the observing eye is within or beyond the conjugate focus of the lens. If an image of a flame is thrown on the lens and the white background with a plane-mirror, one will see the image move with the movements of the mirror. v. MITTELSTÄDT.

ULRY and FRÉGALS (657) found that aqueous solutions of iodide of potassium dropped into the conjunctival sac soon passed into the aqueous humor, but did not reach the vitreous until a time when it could be detected in the urine. When given

internally, in ordinary doses, iodide of potassium cannot be found in the ocular liquids, although it appears when large doses are given. Considerable quantities were found in the aqueous, however, when it was instilled into the eye and given internally at the same time.

In order to determine whether diffusible substances instilled into the conjunctival sac pass through the cornea or the conjunctiva to reach the aqueous humor, a solution of iodide of potassium was brought first upon the one and then upon the other. It was found that diffusion takes place almost exclusively through the cornea. If the epithelium remains intact, diffusion is much slower through the dead than through the living cornea. The aqueous humor does not ordinarily pass through the cornea, because it is of the same composition as the tears. If other liquids are brought into the conjunctival sac, the aqueous humor appears there. When an ointment containing iodide of potassium is placed in the conjunctival sac, the salt alone enters the anterior chamber, and this takes place most readily when the ointment has lanolin for its base.

V. MITTELSTÄDT.

Since Hamilton has found a capsule bacillus in India ink, which, according to LICHERER (659), causes a corneal abscess when inoculated in pure culture, the latter proposes to sterilize the ink by heat.

GUNSBERG (660) believes that the suturing of scleral wounds will preserve many eyes which now it is customary to enucleate. In a case of the author's a sharp arrow perforated the lid and the eyeball, causing a scleral wound 2.5 *cm* long, through which the choroid prolapsed. The prolapse was excised and the wound closed by three scleral sutures, and one conjunctival suture in the ciliary region. The wound healed by first intention, the eye remained of good appearance and there was perception of movements of the hand.

HIRSCHMANN.

The chief point of interest in BEARD'S (661) case is that a woman in good health and sixty-one years of age, with a $M = 5 D$ after an illness associated with great loss of flesh and symptoms of exophthalmic goitre, had a rapid increase of the myopia to -13 in the right and -9 in the left. Visual acuteness was also somewhat diminished.

BURNETT.

MORTON (662) here enters into a fuller description of his modification of Mules's operation in which the glass ball is inserted into the capsule of Tenon instead of the scleral cavity. Strict

attention must be given to the careful adaptation of the sutures so that the tendons shall occupy the same position as in the healthy eye.

BURNETT.

BRUNS (663) reports a case where a number of children—two of whom were seen and examined—of the same family were microphthalmic. The globes were not larger than peas, but there were clear corneæ, through which irides could be seen and opaque lenses. The father had good eyes. The mother had $V = \frac{2}{4}$ and a low degree of astigmatism.

BURNETT.

III.—INSTRUMENTS AND REMEDIES.

664. HALLAUER. On the turning red of eserine. *Zeitschr. f. Augenheilk.*, 1, p. 364.

665. KOSTER. On the injurious action of muriate of cocaine. *Geneesk. Tijdschrift*, 1, 1899, p. 621.

666. BLOK. Neutral sulphate of atropine and muriate of cocaine. *Med. Weekbl.*, 1899, May 13.

667. BIETTI. On the physiological action of arecoline on the eye, with some considerations on its application in the treatment of glaucoma. *Arch. di Ottalm.*, v., p. 33.

668. FALTA. Largin in ophthalmology. *Centralbl. f. prakt. Augenheilk.*, xxiii., p. 46.

669. JAKOWLEW. On the beneficial action of Pöhl's-spermin in eye diseases. *Wratsch*, 1899, No. 10.

670. SCRINI. Experiments with oily collyria. *Arch. d'opht.*, xix., 1, p. 11.

671. ULRY and FRÉGALS. Aqueous solutions of salicylate of soda as collyria. *Ibid.*, 2, p. 90.

According to HALLAUER (664), we have no preparation of physostigmine that will not undergo decomposition. Decomposition by light is accomplished mainly by the rays in the blue end of the spectrum. There are two agents which partly prevent decomposition: sulphurous acid, and 4% boric acid, of which the former is preferable. These chemicals do not affect the action of physostigmine solutions. The salicylate is more permanent than the sulphate, and a drop or two of sulphurous acid added to the solution greatly increases its permanency.

KOSTER (665) objects to the continued use of cocaine in ulcers of the cornea and chronic conjunctivitis. He has sometimes seen

a peculiar form of follicular conjunctivitis follow the continued use of 5 % cocaine. WESTHOFF.

(666) Sulphate of atropine and muriate of cocaine solutions if of acid reaction irritate the eyes and only neutral solutions should be used. If Koster found that 5 % cocaine caused conjunctivitis it was doubtless because he was using an acid solution. WESTHOFF.

Arecoline, according to BIETTI (667), is a very energetic miotic both in healthy and in glaucomatous eyes. It acts more powerfully and energetically than eserine, but its effect is of shorter duration, so that it is of practical use in glaucoma only in cases in which eserine fails to produce miosis. KRAHNSTÖVER.

JAKOWLEW (669) injected spermin subcutaneously with benefit in cases of optic-nerve atrophy, tobacco amblyopia, and opacities of the vitreous (after the underlying serous choroiditis had been recovered from). HIRSCHMANN.

SCRINI (670) was convinced of the rapid action of oily solutions of eserine in two cases of glaucoma in which aqueous solutions of pilocarpine and eserine had no effect. Continuing his experiments, he found that other alkaloids, such as duboisine, homatropine, and scopolamine, as well as eucaine, holocaine, and arthopine, were useful in oily solutions. The disadvantages of these solutions, viz., their tendency to stain clothes and to obscure the view in ophthalmoscopy or in corneal operations, may be overcome and are not of importance. V. MITTELSTÄDT.

The experiments of ULRY and FRÉGALS (671) show that when salicylate of soda is given internally but little of the salt appears in the aqueous humor, but that when dropped into the conjunctival sac much more of it enters the eye. In all cases in which the remedy is indicated it would be well to use it locally as well as internally. V. MITTELSTÄDT.

Sections IV.-VII. Reviewed by DR. ST. BERNHEIMER,
VIENNA.

IV.—ANATOMY.

672. ALFIERI. On the distribution of elastic fibres in the lid margins. *Ann. di Ottalm.*, xxvii., 4.

673. GALLENGA. On the principal congenital alterations in the lachrymal caruncle, with remarks on its structure and development. *Arch. di Ottalm.*, v., p. 1.

674. TORNATOLA. On the origin and nature of the vitreous. *Ibid.*

675. CAPELLINI. On the nerves of the cornea as demonstrated by Golgi's method. *Ibid.*, p. 191.

676. COSMETTATOS. Researches on the development of the lachrymal passages. *Thèse de Paris*, July, 1898.

677. KIRIBUCHI KYOJI. On the elastic tissue in the human eye, with remarks on the dilator muscle of the pupil. *Arch. f. Augenheilk.*, xxxviii., p. 177.

678. SMIRNOW. On the structure of the chorioidea propria (stratum elasticum supracapillare) in man. *Graefe's Archiv*, xlvii., 3.

679. RITTER. Development of the frog's lens. *Arch. f. Augenheilk.*, xxxvii., p. 354.

GALENGA (673) examining a series of embryos finds that the caruncle first appears at the end of the third month. The glandular elements develop at the same time with those of the lids. Gallenga agrees with Krause and others that Krause's glands are often found in the caruncle, but in his opinion sweat glands and glands of Moll are entirely wanting. Elastic tissue is present in considerable quantity, particularly in the superficial layers.

KRAHNSTÖVER.

Capellini's (675) paper consists of descriptions of the nerve endings in the cornea in different classes of mammals, and is interesting from the standpoint of comparative anatomy.

KIRIBUCHI KYOJI (677), in the university clinic in Berlin, repeating Sattler's investigations on the elastic tissue of the eye, but using a new Weigert method, confirms Sattler's results as regards the sclera. Very few elastic fibres were found in the iris, and the limiting membrane does not stain like elastic tissue. In general the amount of elastic tissue increases with age.

V.—PHYSIOLOGY.

680. PARINAUD. Vision. A physiological study. Paris, 1898. O. Doin, editeur.

681. FENOLTEA. Monocular vision and designing. *Arch. di Ottalm.*, v., p. 227.

682. PES. Microchemical researches on the secretion of the palpebral sebaceous glands. *Ibid.*, p. 82.

683. LODATO. On the movements of the pigmented epithelium of the retina. *Ibid.*, p. 395.

684. ANGELUCCI. On the histogenesis of the basal internal limiting membrane of the choroid and of the zone of Zinn. *Ibid.*, p. 383.

685. SNELLEN, H., Jr. On the perception of light and colors. Utrecht, 1899.

PARINAUD (680) collects, in a clearly written volume, the fundamental problems of physiological optics. The captions of the chapters are as follows: 1. Functions of the retina. 2. The rôle of the retina and the rôle of the brain in vision. 3. Anatomical considerations. 4. Binocular vision. 5. Simultaneous vision. 6. Alternating vision. 7. The physiological rôle of the three modes of vision.

VI.—REFRACTION AND ACCOMMODATION.

686. BOTWINNIK. On changes in astigmatism under the influence of some physical and physiological factors. *Dissert.*, St. Petersburg, 1898. *Wratsch*, 1899, No. 4.

687. ROGGMANN. The operative treatment of myopia. *Ann. d'ocul.*, cxxi., p. 1.

688. FUCHS. On the operative treatment of high myopia. *Wiener klin. Wochenschr.*, 1899, No. 6.

689. KLINKOWSTEIN. Report of 50 myopia operations done by Professor Haab at Zurich. *Inaug. Dissert.*, Zurich, 1899.

690. FISCHER. Operation for myopia and detachment of the retina. *Centralbl. f. Augenheilk.*, xxiii., p. 79.

691. STRAUB. On senile hyperopia. *Nederl. Oogheelk. Bydragen*, 1899, p. 11.

692. BURNETT. Astigmatism acquired by a change in the curvature of the cornea. *Amer. Jour. of Ophth.*, Feb., 1899.

BOTWINNIK (686) gives the results of his studies on the correction of astigmatism: (a) through pinching the lids together, and (b) through unequal contraction of the ciliary muscle. The pinching together of the lids may increase the acuteness of vision twofold in regular astigmatism and myopia, not only by narrowing the palpebral fissure in the form of a stenopaic slit, but also by flattening the cornea. Exercising lateral traction on the lids flattened the cornea as much as 2-6 D, increasing the

vision in myopia and in astigmatism against the rule two- or three-fold. Pulling the lids wide apart has the same effect as pinching them together. After paralyzing the accommodation in 30 cases of hyperopic astigmatism, the author concludes that an unequal contraction of the ciliary muscle may correct from 0.5–2.5 D of astigmatism.

HIRSCHMANN.

In order to avoid the chief dangers of the operation for myopia, viz., loss of vitreous and subsequent detachment of the retina, ROGSMANN (687) proposes the following operation: A dissection is made with Bowman's needle without injuring the posterior capsule of the lens. From four to fourteen days after the dissection the lens masses are removed by aspiration with Teale's apparatus.

SULZER.

The short report by FUCHS (688) is of much more value than many of the longer articles on the operations for myopia. Its purpose is to restrict the indications which most operators have considered sufficient. This is an operation in which enthusiasm on the part of the operator is regrettable, for it is likely to lead to the injury of many myopes, and to bring into discredit an operation which, in selected cases, is of value.

Fuchs operates only when the myopia is above 15 D, and when the fundus changes are not advanced. An eye suitable for operation is not operated upon unless the other eye is serviceable, and unless the patient is under forty years of age. The operation is not free from danger, it does not prevent the development of further changes in the fundus, and is not necessary to preserve sight.

KLINKOWSTEIN (689) reports on 50 myopia operations done by Haab. In none was there infection and none was followed by detachment of the retina. The ages ranged from nine to fifty-three years, and the myopia from 8–26 D. The majority of the patients were between the ages of fifteen and thirty. In almost all the eyes the vision was improved very considerably.

In the case by BURNETT (692) there was an increase in the curve of the cornea, as measured by the ophthalmometer, of 2.5 D in one eye and 0.75 D in the other, in the course of six years. The girl was healthy, and there had been no traumatism nor other form of inflammation. The change was "according to the rule."

BURNETT.

VII.—MUSCLES AND NERVES.

693. DE MICAS. "Tare nerveuse" as a factor in strabismus. *Ann. d'ocul.*, cxxi., p. 81.

694. GERONZI. A contribution to the study of ocular disturbances in affections of the ear. *Arch. italiano di otol.*, vii., 4.

695. BACH. On paralysis of the ocular muscles and disturbances of the pupillary reaction. *Graefe's Arch.*, xlvii., 3, p. 508.

696. TÜRK. Remarks on a case of retraction movements of the eyeball. *Centralbl. f. prakt. Augenheilk.*, xxx., p. 14.

697. COLBURN. Further observations concerning the check ligament. *Ophth. Record*, March, 1899.

698. POSEY. De Wecker's capsular advancement operation. *Annals of Ophth.*, Jan., 1899.

699. GAMBLE. Voluntary lateral nystagmus. *Jour. Am. Med. Assoc.*, March 4, 1899.

DE MICAS (693) finds among the immediate and collateral ancestors of patients with squint a great number who are neuropathic. The commoner forms of such neuropathy in the order of their frequency are idiocy, psychoses, and epilepsy. An ametropic child of neuropathic parents will usually squint. And, although the ametropic may have strabismus without any hereditary predisposition, a hereditary predisposition may bring about strabismus in a child whose eyes are emmetropic; as, for example, in the case of hysterical squint. The neuropathy, in the sense understood by the author, need not be characterized by the advanced degeneration existing in the hysterical, epileptic, and the like. The hereditary disposition caused by ordinary nervousness in the parents may manifest itself in the children only in convulsions and such unimportant and quickly forgotten symptoms and yet be sufficient to bring about squint.

SULZER.

GERONZI (694) reports a case of purulent otitis media in the course of which, about the twentieth day, there appeared suddenly a paralysis of one external rectus. The paralysis soon passed off of its own accord, while the suppuration was stopped only by operative measures. The author expresses no opinion as to the connection between the two.

KRAHNSTÖVER.

BACH (695) made many experiments on rabbits, cats, and monkeys, and studied human specimens as well, in order to determine the exact location and composition of the nuclei of origin of the nerves supplying the ocular muscles, and the course of the fibres arising from them. His findings cannot be given intelligibly in an abstract.

After removing the iris and ciliary body or after exenteration

of the ball, almost all the cells in the ciliary ganglion showed well marked changes after a few days. After more or less extensive destruction of the sensory nerves of the cornea no noticeable changes were found in the cells of the ciliary ganglion. Bach's studies of the ciliary ganglion seem to indicate its sympathetic nature. The reflex centre lies not in the brain but in the upper portion of the cerebral portion of the cord, directly beneath the medulla oblongata.

HORSTMANN.

TÜRK (696) describes a case of retraction movement of the eye, which is similar to two cases previously reported (*Deutsche med. Wochenschr.*, No. 13, 1896). In this case there was a congenital weakness of abduction, and action of the internal rectus retracted the eye and caused a narrowing of the palpebral fissure. The congenital nature of the weakness of abduction was proved in the present case also by the lack of secondary contracture of the antagonists.

COLBURN (697) has continued his studies on the check ligament of the ocular muscles, and has operated on three cases of squint—two of which were convergent and one downward—by severing the check ligament alone with what he calls “forcing stitches” to exaggerate the result. In no case was the tendon severed. The result in all the cases was satisfactory. He considers there is a wide opportunity for study in this field opened up by the studies of Motais and Maddox on the check ligament.

BURNETT.

POSEY (698) reports the final effects, mostly after a period of two years, in thirty-three cases of capsular advancement according to De Wecker. The average final gain in these cases was about 6°, though the immediate gain in some cases was as much as 50°. Twenty-eight of these cases were exophorias, varying from 6° to 25°, and the improvement in the symptoms was very great, though subjectively the effect seemed to be small.

BURNETT.

In the case reported by GAMBLE (699), a young man of twenty-four, perfectly healthy, with vision of $\frac{2}{3}$, has been able since his fifteenth year to produce voluntarily a lateral nystagmus. He cannot continue it beyond a minute, nor can he produce it with one eye alone.

BURNETT.

Sections VIII.-XII. Reviewed by DR. R. SCHWEIGGER,
BERLIN.

VIII.—LIDS.

700. JOERS. Demodex or acarus folliculorum and its relations to inflammation of the margin of the lid. *Deutsche med. Wochenschr.*, 1899, No. 14.

701. TROUSSEAU. The treatment of eczema of the lids. *Arch. d'opht.*, xix., 2, p. 119.

702. BRUCKMAYER. Syphilitic tarsitis. Sitzungsbericht. *Ungar. med. Presse*, 1899, No. 14.

703. WICHERKIEWICZ. On the operative technique of ectropium of the lower lid. *Beiträge z. Augenheilk.*, xxxviii., p. 14.

704. GEISMAR. On congenital defects of the lid. *Ibid.*, xxxvii.

705. ROOSE. A case of poliosis of the lids. *Ann. de l'Institut Saint-Antoine à Courtoix*, April, 1898.

JOERS (700) does not recognize Raehlmann's blepharitis acaria as a special form of inflammation of the lid, since the presence of the acarus does not cause a peculiar clinical picture, and he has found the acarus in normal lids more frequently than in diseased lids.

The case of syphilitic tarsitis demonstrated by BRUCKMAYER (702) is remarkable because the affection of the tarsus appeared in the secondary stage of the disease. HERRNHEISER.

WICHERKIEWICZ'S (703) method can be used alone or in combination with other methods for relieving ectropium of the lower lids. It consists in a displacement of that portion of the orbicularis muscle which lies in front of the tarsus to a position above the tarsus.

GEISMAR (704) reports five cases of coloboma of the lids, upper as well as lower, unilateral and symmetrically bilateral, in conjunction with other clefts of the face and dermoids. He agrees with Van Duyse that the colobomata of the lids arise in consequence of amniotic adhesions, and that the dermoids correspond to the points of adhesion.

ROOSE (705) reports the case of a healthy girl of seventeen with dark brown hair, who was violently frightened in the night. The following morning it was noticed that the eyelashes on the right side and a lock of hair on the right temple had become quite gray. SULZER.

IX.—LACHRYMAL APPARATUS.

706. LANGE. On the anatomy and pathogenesis of dacryops. *Graefe's Archiv*, xlvii., 3, p. 503.

707. CAHN. On the etiology and therapy of dacryocystoblennorrhœa. *Beiträge z. Augenheilk.*, xxxix., p. 1.

708. ARONIS. Extirpation of the lachrymal sac. *Ann. d'ocul.*, cxxi., p. 198.

709. ROCHON-DUVIGNEAUD. A dilatation of the lachrymal passages in the fœtus and the new-born in consequence of closure of their lower orifice. The anatomical conditions which favor congenital dacryocystitis. *Arch. d'ophth.*, xix., 2, p. 81.

LANGE (706) observed a case of bilateral dacryops. On one side the tumor swelled to the size of a hazel-nut when the patient wept, and pressed upon the eye. After being removed under cocaine anæsthesia, the tumor proved to be a retention cyst caused by the stoppage of the ducts of exit from a desquamative catarrh.

CAHN (707) probes the lachrymal duct only in cases in which there is no question as to the existence of stricture, but he considers removal of secretion to be of great importance. Irrigation of the sac with disinfecting and astringent solutions produces improvement even in obstinate cases. He uses oxycyanide of mercury, 1:5,000-1:10,000, bichloride of mercury, 1:20,000, or permanganate of potassium, 1:10,000; for astringent solutions he has used nitrate of silver, and recently argonin. The latter remedy was used with good results. He begins with a 4% argonin solution in glycerine and water. As soon as the secretion has lost its purulent character he uses weaker solutions, and concludes the treatment with irrigation of the sac three times a week for three weeks with $\frac{1}{4}$ - $\frac{1}{2}$ % solution of iodine in glycerine. In obstinate cases, and especially when there is a fistula, he employs also a pressure bandage or a special compressor fastened to a band about the forehead. In case of granulation or caries of the lachrymal bone he cures. Extirpation of the sac is undertaken only in extreme cases, since the results of the operation are unsatisfactory.

HIRSCHMANN.

ROCHON-DUVIGNEAUD (709) in thirty new-born infants found unilateral or bilateral closure of the lower end of the canal in three. There is swelling of the mucosa at the orifice, or a deformity of the exit, which prevents the passage of the tears. The dilatation of the canal so produced may affect the bony wall

causing the variety in size of lumen which is found in adults. If infection takes place, a suppurative inflammation of the sac ensues, but this may pass off after probing the canal a single time. In several frontal sections the author demonstrated the distension of the canal and the elevation at its orifice, above which in two cases there was further a membranous obstruction, while folds of mucous membrane projected into the lumen of the canal at other points.

V. MITTELSTÄDT.

X.—ORBIT AND NEIGHBORING CAVITIES.

710. COPPEZ. Fracture of the vault of the orbit with contusion of the globe and traumatic intraorbital adhesions between the levator of the lid and the superior rectus. *Arch. d'opht.*, xix., 3, p. 183.

711. HOFFMANN. On affections of the orbit due to suppuration in the accessory cavities of the nose. *Jahresber. d. Ges. f. Nat. u. Heilkunde i. Dresden*, 1897-98, p. 6.

712. SANTOS FERNANDEZ. The exenteration of the orbit and the ablation of the lids; their advantages in some cases of neoplasms of the eye. *Annales de oftalm.*, i., 6, p. 141.

713. GALLEMAERTS. Traumatic suppurative tenonitis. *Ann. d'ocul.*, cxxi., p. 57.

714. BLASCHEK. Two cases of echinococcus of the orbit. *Wiener klin. Wochenschr.*, 1899, No. 6.

715. VENNEMAN. Double orbital lymphoma in an adult. *Ann. d'ocul.*, cxxi., p. 56.

716. GALLENGA. A contribution to the study of the congenital tumors of the orbit (fibro-lipoma). *Arch. di Ottalm.*, vi., 5, p. 133.

717. FISCHER. Traumatic enophthalmus. *Centralbl. f. pr. Augenheilk.*, xxvii., p. 48.

718. REIF. A case of bilateral pulsating exophthalmus. *Beitr. z. Augenheilk.*, 38, 1899.

719. LEITNER. A case of periodic exophthalmus. *Ung. med. Presse*, 1899, No. 7.

720. ELLINGER. A case of empyæma of the frontal sinus, with operative removal of the posterior bony wall for caries. *Zeitschr. f. Augenheilk.*, i., 2, p. 74.

COPPEZ'S (710) patient was struck with a heavy piece of iron,

and suffered a fracture of the roof of the orbit with contusion of the ball, revealing itself in dilatation and immobility of the pupil, rupture of the choroid and hemorrhages of the retina. While the mobility in the horizontal direction was normal, there was complete immobility of the eye and lids in the vertical meridian. Even when seized with forceps the eye could not be drawn upward, so that there must have been a cicatricial adhesion of the levator and the superior rectus to the cellular tissue or periosteum of the orbit.

v. MITTELSTÄDT.

BLASCHEK (714) reports two cases of echinococcus cyst of the orbit, only 59 cases of which have been reported since 1774. In a tumor of this sort, which grows slowly and usually fluctuates, a diagnosis cannot be made with certainty. Tapping the cysts for diagnostic purposes is not to be recommended, since it frequently leads to inflammation and suppuration. In both the author's cases the cyst was opened. One healed well, but the other suppurated and required enucleation.

In FISCHER'S (717) case a fall on the upper margin of the orbit caused atrophy of the entire half of the face as well as exophthalmus, so that a simple disappearance of orbit fat could be held responsible for the exophthalmus.

In REIF'S (718) case, after repeated injuries, first a left then a right exophthalmus developed with a pulsating bruit audible over the entire head. Reif explains the condition as being due to a communication between the left internal carotid and the cavernous sinus. Digital compression of the carotid, increased gradually from 3 to 25 minutes at a time, caused a disappearance of the right exophthalmus. In a second case, one of exophthalmus after a penetrating wound of the orbit, the subjective sounds were so annoying to the patient that the common carotid was ligated.

LEITNER'S (719) patient with periodic exophthalmus was a woman of forty-four. When she exerted herself or bent forward the right eye became prominent, while the right upper lid and the surrounding parts became swollen. On assuming an erect position the eye slowly regained its natural position. Since these phenomena had become noticeable the hearing of the right ear began to fail and the patient had continuous tinnitus, increasing when she bent forward. In the right upper lid there was a network of veins. When the patient bent forward these veins became greatly dilated. An extension of these varicose veins caused the exophthalmus.

In ELLINGER's (720) patient, after the frontal sinus had been probed and irrigated for three months without any pus appearing although its presence was suspected, the eye became inflamed and examination showed the posterior wall of the sinus to have been very much thinned by caries. It was chiselled out and a threatening meningitis warded off.

XI.—CONJUNCTIVA.

721. ANGELUCCI. On an unrecognized syndrome in patients with vernal catarrh. *Arch. di Ottalm.*, v., p. 270 et seq.

722. COPPEZ. Follicular conjunctivitis and adenoid vegetations in the naso-pharynx. *Arch. d'opht.*, xix., 1, p. 11.

723. JUNIUS. On acute pneumococcus conjunctivitis. *Zeitschr. f. Augenheilk.*, 1899, 1, p. 43.

724. DALÉN. On the bacteriology of conjunctivitis. *Hygeia*, March, 1899.

725. GONIN. On the microbic nature of the conjunctivitis observed at the ophthalmic hospital of Lausanne. *Rév. méd. de la Suisse romain*, 1899, Nos. 2 and 3.

726. KUHN. On the value of mechanical methods in the treatment of granular conjunctivitis. *Zeitschr. f. Augenheilk.*, 1899, 1, p. 1.

727. GALEZOWSKI. On the treatment of trachoma by excision of the cul-de-sac. *Rec. d'opht.*, 1899, p. 1.

728. DEMICHERI. Conjunctival actinomycosis. *Arch. d'opht.*, xix., 2, p. 102.

729. HÜBNER. On amyloid disease of the conjunctiva. *Beiträge z. Augenheilk.*, 1899, 38.

730. BERL. Pseudo-leukæmic disease of the conjunctiva and orbital tissues. *Ibid.*, 37.

731. GRUNERT. Five cases of papilloma of the conjunctiva. *Zehender's klin. Monatsbl.*, xxxviii., p. 111.

732. BEST. On benign cystic epithelioma of the conjunctiva. *Beiträge z. Augenheilk.*, 37, Jan., 1899.

733. GERY. On a case of congenital cyst of the conjunctiva. *Ibid.*, 39.

734. ZIMMERMANN. A case of hemorrhagic lymphangiectasis of the conjunctiva. *Ibid.*, 37.

735. PECK. Protargol and argonin in the treatment of purulent ophthalmia of infants. *Med. News*, Jan. 21, 1899.

736. SNYDOCKER. Trachoma. Original investigations on its etiologic organism. *Four. Amer. Med. Assoc.*, Feb. 4, 1899.

737. ABBE. A case of fatal hemorrhage from the conjunctiva. *Annals of Ophth.*, Jan., 1899.

738. HEUSTIS. Osteoma of the conjunctiva. *Ibid.*, Jan., 1899.

739. MORTON. Punctate hemorrhage into the bulbar and palpebral conjunctiva, following the administration of nitrous oxide gas. *Ophth. Rev.*, Feb., 1899.

ANGELUCCI (721) calls attention to an affection of the vascular system which he has found complicating vernal catarrh in 50 patients. The patients were mostly of irritable temper. They suffered from rushing of blood to the face and head; there was palpitation of the heart and an accelerated pulse. Several members of a family were frequently affected. Before he attempts to trace a connection between these symptoms and the conjunctival affection, the author wishes to learn the observations of others in the matter.

KRAHNSTÖVER.

COPPEZ (722) describes the various forms of follicular conjunctivitis, and in particular those cases which accompany adenoid vegetations in the rhino-pharynx, of which he reports two cases. These cases recover only when attention is paid to the throat and the scrofulous condition is treated.

V. MITTELSTÄDT.

JUNIUS (723) examined bacteriologically the secretion of 60 cases of acute and subacute conjunctivitis, in Königsberg. The pneumococcus was found in 49 cases, in 31 in pure culture, and in 18 mixed with staphylococci and xerosis bacilli. The Koch-Weeks bacillus was not found.

KUHNT (726) recommends, in preference to Knapp's roller forceps which may sometimes tear the conjunctiva, an expressor, which is a forceps with perforated blades, with which the granules may be thoroughly expressed. Individual granulations that return may be destroyed advantageously with the galvano-cautery. Excision of the retrotarsal folds brings about a permanent cure in 50-60 % of patients under unfavorable hygienic conditions, while expression in this class of patients cures only 10 % of cases.

In a patient who presented himself with conjunctivitis, DEMICHERI (728) found in the conjunctiva of one eye, just above the tarsal margin, 15 grayish-yellow nodules, which were found to be

foci of actinomycetes. This is common in cattle in South America, and is sometimes directly transferred to man.

V. MITTELSTÄDT.

HÜBNER'S (729) patient, who was healthy except for trachoma in the other eye, had an amyloid tumor which on the conjunctiva of the lower lid and eyeball appeared as a movable translucent uneven mass, bleeding easily, and on the upper lid it has so thickened the tissues that the lid could not be actively lifted. A year after its extirpation, the mass had grown again and the granular conjunctiva of the other eye had assumed a similar character.

BERL'S (730) case was one of pseudo-leukæmia with many tumors on the head and neck. The eyelids were thickened by subconjunctival, grayish-red, homogeneous, opaque nodules, over which the conjunctiva was degenerated. The nodules, which were composed of lymphoid tissue, soon returned after extirpation.

The rare conjunctival tumors, of which one is reported by BEST (732), are either congenital or develop early in life as a dull yellow, translucent, smooth mass, covered with vessels at the corneal limbus, which may increase greatly in size about the age of puberty. They do not return after extirpation. An absolute diagnosis can be made only with the microscope.

ZIMMERMAN'S (734) patient had a 1-cm-broad zone of concentric red tracts about the cornea. In microscopic preparations these were recognized as dilated lymph vessels of the conjunctiva which from a trauma had been thrown into open connection with a blood-vessel.

PECK (735) reports seven cases of purulent gonorrhœal ophthalmia which were treated by protargol and argonin. He used protargol powder dusted in the eye three times a day, gradually reduced in frequency to once, and later a 50% solution was used. At the last a 5% solution was used as satisfactorily as the stronger forms.

BURNETT.

SNYDOCKER (736) claims to have isolated a microbe which he deems the cause of trachoma. It is a diplococcus like the pneumococcus, but smaller. His experimental inoculations in animals were not altogether successful, but he succeeded in inoculating a human conjunctiva with a culture and at the end of the third week he claims the appearances were those of typical trachoma. Micro-organisms obtained from the material expressed from the granules were of the same nature as those originally inoculated.

BURNETT.

In the case recorded by ABBE (737), a newly born, apparently healthy but small infant had a slight discharge from the eyes, for which, by mistake, a 60 % sol. of arg. nit. was used for a single time. Soon after the conjunctiva of the lids of both eyes began to discharge blood, which was not controlled, and the child died—presumably from the loss of blood—within forty-eight hours. The conjunctiva of the lids seems to have been completely disorganized.

BURNETT.

HEUSTIS (738) gives an account of a tumor of the bulbar conjunctiva upward and outward from the cornea, which, when removed, was found to consist of bone. Its size was $7 \times 4 \times 2$ mm, concave and smooth on its inner surface, rough on the outside. The vision was normal.

BURNETT.

In the case reported by MORTON (739), a young woman, after the administration of nitrous oxide gas for the extraction of a tooth, had small hemorrhages on her left breast and neck, and on the conjunctiva both palpebral and bulbar, of both eyes—more pronounced in the left. They were gradually absorbed.

BURNETT.

(*To be continued.*)

REPORT OF THE TRANSACTIONS OF THE AMERICAN
OPHTHALMOLOGICAL SOCIETY AT ITS MEETING
AT NEW LONDON, CONN., JULY 19 AND 20, 1899.

By DR. H. O. REIK, BALTIMORE.

The meeting was called to order by the President, Dr. O. F. WADSWORTH.

I.—Dr. R. H. DERBY, of New York, gave **a demonstration of a new office stereoscope.**

The stereoscope is modified in several particulars from the instrument he described in the Transactions of the New York Eye and Ear Infirmary for the year 1898.

The two half-pictures, held on carriers, controlled for both lateral and vertical displacement by a concealed ratchet movement, move over a plain metal field, on the back of which are horizontal and vertical lines, a centimetre apart. The position of the centre of each half-picture, when stereoscopic vision is secured, is indicated to the observer through an opening in the back of the carrier. The vertical lines are numbered, and the horizontal ones marked by letters of the alphabet. For the use of patients at their homes a less elaborate mechanism was shown. On this the half-pictures were arranged to move vertically on perforated lines, one centimetre apart, and to secure lateral distance the carrier was moved from one vertical line to another, the carrier held secure by a spring confining it to the thickness of the object card.

The author claimed for the stereoscope, especially in its present form, an important place as an instrument for the diagnosis of some muscular anomalies—notably in the case of vertical insufficiency, the indication from the position of the half-pictures, in the interest of binocular vision, was suggestive. Hyperphoria, of however slight degree, was often indicated by a difference in height at which the patient promptly adjusted the pictures.

Under ordinary conditions of muscular equilibrium the lateral

distance from the middle line experience has shown to be 4.5 centimetres. With the pictures placed at 3.5 centimetres, insufficiency of externi, or at 5.5 centimetres of the interni, would be indicated. The author claimed that in its present form the instrument possesses distinct advantage in the orthoptic treatment of muscular anomalies over the limited applicability of the cards of Dahlfeld and Kroll, and was simpler and more readily used than the ingenious series of Javal. The author did not claim that the stereoscope gave an accurate measure of the degree of the muscular weakness. It was rather an aid in diagnosis that deserved a more general recognition, and the present modification was perhaps the best instrument we possessed in the interest of ocular gymnastics.

II.—Dr. F. H. VERHOEFF, of Baltimore, upon invitation of the society, gave **a description of the reflecting phorometer and a discussion of the possibilities of torsion of the eyes.**

The instrument differs from other phorometers in that mirrors are used in place of prisms, thus permitting the greatest simplicity in construction, together with the most advantageous movements in the apparent images. There are four mirrors, two for each eye. By turning a screw the lower mirrors may be made to rotate towards or away from each other, lateral separation of the images thus being produced, and it is to be noted that this arrangement produces equal though opposite movements in the two images. Vertical separation of the images is produced by rotation of one of the upper mirrors.

The parallax test of Duane has been adapted to this instrument. A very important feature of this phorometer is a shutter which slides back and forth before the eyes, so that when it is in use the patient can see with one eye at a time. The shutter is moved back and forth very quickly, a pause being made, however, before each eye so that time is given for the after-image to disappear, and the patient is asked to state whether the object moves or not. If he sees the object apparently moving obliquely, the upper mirror is adjusted until the movement is horizontal, and then the lower mirrors are adjusted until practically all movement is overcome. Both the amount of hyperphoria, and also the esophoria or exophoria, if present, will be indicated upon the scales. It is thus possible by means of the reflecting phorometer to determine the amount of heterophoria either by the diplopia test or by the shut-

ter test, and in addition the amount of abduction, adduction, and right or left sursumduction of the eyes may be readily obtained. Certain disadvantages and inaccuracies in the ordinary diplopia test were pointed out. By means of a special chart consisting of two rotary discs placed one above the other the instrument may be used to determine and measure any possible torsional deviations of the eyes. It was shown that by means of the instrument an artificial torsion could be produced in the retinal image of any object regarded. In this way it was determined that the eyes can bear without discomfort a tilting of the retinal images in the two eyes equivalent to the torsion of 8° . It was stated that torsion could also be accurately measured by means of the shutter test. The possibilities as regards torsion of the eyes were classified as follows :

1. Non-neutralizing declinations of the two eyes. These include declinations which are numerically equal but which have the same sign.
2. Neutralizing declinations of the two eyes. These are numerically equal but have opposite signs.
3. Torsional combining power or an ability so to rotate as to overcome artificially produced declinations.
4. Cyclophoria, a tendency for the eyes to rotate, which, however, is overcome by the action of certain of the ocular muscles.

Four experiments were described to prove that (3), and consequently (4), do not exist. Since (2) could not interfere with perfect binocular vision, (1) is the only remaining possibility of any moment, and for this the term "torsional strabismus" was used. Since the fusion of lines situated upon non-corresponding points of the two retinæ is not due to torsion of the eyes it was spoken of as due to a physical compensation. Dr. Verhoeff believes that the existence of a torsional combining power was assumed by Stevens without sufficient evidence, and that Savage has fallen into an error in assuming the existence of cyclophoria.

III—Dr. J. O. TANSLEY, New York. **Congenitally ineffective external rectus and binocular vision.**

CASE 1.—When an infant was about six months old it was noticed that he had a slight squint in the right eye, and also that he twisted his head to the right and slightly upwards. When he looked straight ahead the eyes were straight, but if he attempted to turn the eyes to the right the right eye could not be moved beyond the middle line. He visited Dr. Tansley when eighteen years of age, when the left eye had perfect motility, but the right,

although it had perfect movement upwards, downwards, and nasally, could not be moved quite to the middle line outwardly. Upon his making a supreme effort to rotate it out the eyelids showed the effort by widely opening and fluttering spasmodically. He had binocular single vision in all parts of the left field, but a pencil held directly in front of him appeared double, and the farther it was moved to the right the greater became the diplopia.

The diagnosis was congenital absence or atrophy of the right external rectus with little or no possibility of benefit by operation. A slight tenotomy was done, however, and the eyes had perfect parallelism in the median line. Ten months later he could read, binocularly, J. No. 1, at four inches; otherwise his condition was the same as at first.

CASE 2.—A clerk, twenty-seven years of age, who has had trouble with his eyes and worn glasses since nine years old. Never squinted, but has always turned his head to the left, or eyes to the right, when working at anything. If he looks directly ahead or tries to turn his eyes to the left he sees double. Examination showed that he could not bring the left eye quite to the median line. Other movements were perfect.

IV.—Dr. F. BULLER, Montreal. **A case of primary tumor of the optic nerve.** The patient was a boy, aged six, in good health save for some slight nervous disturbances. There was marked exophthalmus of the right eye, and ophthalmic examination showed the optic nerve of a pale blue tint with oval outline and irregular edges. Palpation revealed within the orbit a large, somewhat elastic mass, and this, together with the complete blindness, seemed to indicate the presence of a tumor involving the optic nerve. An attempt was made to remove the growth only, but it became necessary to enucleate the globe also. One month after the operation, the patient was reported to be in good health and free from nervous attacks.

A pathological study of the tumor showed that it belonged to that class usually described as myxosarcomatous, but there were changes in the optic nerve which suggested that possibly the whole condition was due to some local disturbance of the lymphatic system.

Discussion.—Dr. REEVE related a case seen at the Birmingham Ophthalmic Hospital, where, in spite of a tumor of the optic nerve, there was preservation of excellent, if not normal, vision.

Dr. BULLER said that in two other cases which he had seen,

there was blindness, and he had considered that together with optic atrophy a diagnostic feature of optic-nerve tumors.

V.—Dr. C. A. VEASEY, Philadelphia. **A case of primary non-pigmented sarcoma of the left upper lid.** Dr. VEASEY reported a case occurring in a Polish tailor, forty-five years of age, who had first observed a small growth on his eyelid four months before presenting himself for advice. It had increased in size gradually, and resembled a chalazion in many respects. The growth was adherent to the overlying skin, but freely movable over the tarsus. It was easily dissected out, and proved to be an encapsulated, non-pigmented, spindle-celled sarcoma made up of several lobules.

A review of the literature discloses about fifty cases previously recorded.

VI.—Dr. F. BULLER, Montreal. **An instrument intended to facilitate the operation of capsulotomy.** Two needles were set in an ordinary handle, exactly parallel with each other, not more than 0.25 mm in diameter and quite sharp. The method of operation is as follows: After dilatation of the pupil a careful inspection is made to disclose the weakest and the strongest parts of the capsule to be divided, bearing in mind that the aperture to be made must be as nearly as possible central. The double needle is passed through the cornea at any convenient point to the denser portion of the capsule, and the Knapp needle-knife passed through the sclero-corneal junction to the line of its first incision through the thinnest part. The second incision is then made by passing the cutting needle between the limbs of the double needle and cutting the denser capsule at one sweep. The double needle is to be withdrawn first and then the cutting needle.

Discussion.—Dr. STANDISH said that he had not seen this needle before, but some years ago had used the double needle quite frequently, but had found considerable difficulty in cutting the capsule without pushing it in before the instrument, and had consequently abandoned the method.

Dr. BULLER replied that he did not attempt to cut the capsule with the double needle, but merely exerted enough pressure to steady the capsule for incision with the needle-knife.

VII.—Dr. R. W. RANDOLPH, Baltimore. **A case of expulsive intra-ocular hemorrhage after preliminary iridectomy for cataract.** The patient, a woman of seventy-six, had

a mature cataract in the right eye and marked striæ of the lens in the left eye. She seemed in excellent health, and there was no reason why extraction should not be done. As she would not consent to enter the hospital, it was decided to operate at home, doing a preliminary iridectomy. This part of the operation was perfectly smooth, and the next day when the bandage was removed, everything was all right, the coloboma was clean and there was scarcely a trace of redness. On the morning of the third day, he was sent for because the patient had suffered severe pain during the night. He found the anterior chamber almost obliterated, the lens pressed forward so that the iris was pushed against the posterior surface of the cornea and the upper edge of the lens was close to the corneal wound. Cold compresses were applied, but as the eye looked worse the next day, extraction was attempted. The lens popped out with force, and was immediately followed by a mass of vitreous stained a deep red. The result was a shrunken eyeball.

Six months after this, glaucoma appeared in the left eye and in spite of non-operative treatment went on to blindness in nine months. Paracentesis of the vitreous was performed for the relief of pain and was quite successful. Dr. Randolph thinks, in view of the action of the left eye, that there probably existed a glaucomatous condition of less advanced stage in the right eye at the time of the iridectomy.

Discussion.—Dr. FRYER said he had met with several cases of hemorrhage after extraction. He considered this case especially interesting because the hemorrhage followed the very slight change of pressure produced by an iridectomy, and illustrates how little change may be necessary to produce hemorrhage in an eye that is predisposed thereto.

Dr. SUTPHEN reported a case of hemorrhagic glaucoma upon which he had attempted an iridectomy, but had a profuse loss of vitreous with destruction of the eye.

Dr. CARMALT asked if there had been any examination of the kidneys in this case, and both Drs. Randolph and Fryer replied that they had examined the urine in such cases with negative results.

Dr. MILLIKIN reported a case of hemorrhage occurring on the sixth day after extraction in which no serious results followed because the hemorrhage gradually cleared up.

Dr. REEVE said he had operated upon the second eye successfully, after the loss of the first by hemorrhage, and did it by first

performing a paracentesis, then an iridectomy, and, lastly, an extraction.

Dr. WADSWORTH reported one case of such profuse hemorrhage following an iridectomy that he was compelled to abandon the operation of extraction which he had intended.

VIII.—Dr. CHAS. STEDMAN BULL, New York. **Retinitis albuminurica as a factor in secondary glaucoma.** The connection between retinal hemorrhage and secondary glaucoma is recognized by all, but the connection between retinal albuminurica and secondary glaucoma does not seem to be so clearly recognised. The connecting link is probably more or less extensive disease of the walls of the blood vessels, which may be regarded as a common cause of both the retinitis and the hemorrhages. It is generally conceded that interstitial nephritis is the variety usually accompanied by retinal hemorrhages, and in this form of nephritis the general constitutional symptoms vary greatly in different cases. Albuminuria, the most certain sign, is occasionally absent, and when present is slight in amount and not easily detected. Two symptoms are rarely absent, however, and these are cardiac hypertrophy, with a doubling of the first sound, and certain cerebral phenomena. The most frequent head symptom is a continuous frontal or occipital headache. When these symptoms are found the urine should be subjected to frequent analysis.

In looking over the literature of hemorrhagic glaucoma he finds that many of the published cases were marked by these symptoms. In almost all the cases of secondary glaucoma preceded or accompanied by retinal hemorrhages and exudation it is quite impossible to decide whether the glaucoma is really secondary to the hemorrhages or whether the two are simply associated.

Dr. BULL then reported in detail four cases of acute glaucoma following exudative retinitis albuminurica.

Discussion.—Dr. PROUT suggested that possibly we could gain some knowledge of the cause of glaucoma if we could follow up a number of cases and see what the patients eventually die of.

Dr. WADSWORTH reported one case of secondary glaucoma in both eyes, in which he had been able to follow the patient's history until she died of acute pneumonia, but at no previous time had she been a subject of any discoverable disease.

Dr. HOWE brought up the question of heredity as a factor in the causation of glaucoma, and reported one family with eight cases of secondary glaucoma in three generations.

Dr. MITTENDORF said concerning heredity that the Hebrew population was especially prone to this disease.

IX.—Dr. A. ALT, St. Louis. **Anomalies in the epithelium of the crystalline lens and anterior polar cataract.** The author believes that contact between the anterior capsule and the posterior surface of the cornea, whether this part be otherwise healthy or infiltrated with pus, even if it be prolonged, cannot alone be the cause of the formation of an anterior polar cataract ; that if it was it should occur now and then after a perforating injury of the cornea and with more frequency after ulcerative perforations of this membrane.

As to the cases of congenital nature, he was not inclined either to accept the theory of intra-uterine corneal perforation as an explanation, because in so many cases heredity seems to be an important factor.

He had studied microscopically a number of cases and believed that the prime cause of the formation of an anterior polar cataract is some congenital malformation of the lens, and that this is represented by a break in the continuity of the capsular epithelial layer as well as a dissolution of the contact between this layer and the lens capsule. With such an anomaly the capsule would be in much the same condition as Descemet's membrane after a loss of continuity in its endothelial lining, and this would permit of the penetration of substances into the lens which might be followed by the formation of cataract.

X.—Dr. W. B. JOHNSON, Paterson, N. J. **A method of converting the alternating current for use in connection with the Johnson magnet.** The magnet devised by Dr. Johnson and described in the May number of these ARCHIVES is of use only with a direct current of 110 or 120 volts, and as the street-lighting current in many cities is of the alternating variety it is essential that some means be used to convert it into a direct current in order to adapt it for use with this magnet. The method suggested is as follows : A $\frac{1}{4}$ -horse-power fan motor for the alternating current is fitted with a pulley which is to be belted at a distance of three feet to a $\frac{1}{4}$ -horse-power fan motor made for the direct Edison current ; the speed of the motors to be the same. The Edison motor by changing the leads acts as a generator and furnishes the $\frac{1}{2}$ -ampere of current at 110 volts necessary fully to saturate the core of the magnet.

XI.—Dr. W. B. JOHNSON, Paterson. **Report of three cases**

of magnet extraction of steel from the eyeball, through the point of entrance.

CASE 1.—A laborer, age twenty-six, was struck in the eye by a piece of steel. Examination made one hour later disclosed a perforating wound in the ciliary region on the nasal side about two lines in length. Extensive intra-ocular hemorrhage prevented a view of the fundus. Tension minus. The ovoid tip of the magnet held near the wound produced pain which increased as the eye was approached, but after several efforts the foreign body became engaged in the wound; was removed by forceps and measured $\frac{3}{8}$ inch long and $\frac{1}{8}$ inch wide and $\frac{1}{32}$ inch thick. Ten days later the eyeball had resumed a normal appearance with a vision of $\frac{2}{10}$.

CASE 2.—A machinist applied for treatment, stating that four days previous while chipping cast iron he was struck in the right eye by a piece of flying metal, and he had been told that the eye was cut and advised to have it enucleated. There was marked proptosis, conjunctival chemosis, and a penetrating horizontal wound in the lower part of the cornea. The corneal wound seemed to be partially closed and the general appearance suggested panophthalmitis. The ovoid tip of the magnet approached to the eye caused sharp pain, but soon the edge of the iron could be seen, and it was evidently too large to pass through the partially closed aperture. The wound was enlarged and on again approaching the magnet the piece of iron jumped out. It measured $\frac{1}{4}$ inch long, $\frac{3}{16}$ inch broad and $\frac{1}{16}$ inch thick. Prompt recovery took place, and at present he has distinct shadow perception.

CASE 3.—Blacksmith. While holding a hammer, which was being struck with a sledge, he was struck in the right eye by a piece of flying steel which he thought had entered the globe. On examination four hours later there was slight sinking of the eyeball, a vertical corneal wound extending from the centre upwards past the limbus, the iris was torn and prolapsed, the lens capsule ruptured, and the steel could not be seen. It was, however, easily removed by the magnet and measured $\frac{3}{8}$ of an inch long by $\frac{1}{8}$ inch thick. Recovery took place slowly, but the indications are favorable for the preservation of the ball.

Discussion.—Dr. HOWE said that with some magnets he had experienced this difficulty, that when the foreign body was drawn up to the wound it was scraped off in the effort to withdraw it.

Dr. HOLT answered that he had overcome this difficulty by

having an assistant separate the edges of the wound with a small Stevens's strabismus hook.

Dr. HARLAN spoke of the necessity of attempting the removal of foreign bodies as soon as possible after the injury and before they could be bound by exudative material.

XII.—Dr. J. O. TANSLEY, New York. **A cyst of the vitreous.** The patient came for advice saying that the sight in the right eye had been defective for about a year. There was no pain and no discomfort. V. equal $\frac{20}{100}$ and with $+$ $\frac{1}{48}$ was $\frac{20}{70}$. There was a very pretty picture of a floating body in the vitreous, spheroidal in shape and about the diameter of the optic disc. When the eye was quiet it settled to the lower portion of the chamber and remained there in contact with the retina, but any movement of the eyeball caused it to jump about with great rapidity. The vitreous appeared to be fluid, and one could look through the transparent anterior capsule and contents of the cyst to see pigment spots on its posterior capsule. It seemed to be of a benign nature.

Discussion.—Dr. ALT suggested that this cyst might be an adenomatous tumor detached from the ciliary processes and undergoing mucoid degeneration.

Dr. RANDALL thought it more likely a detached cyst, such as those occasionally seen at the edges of a coloboma, and that it had been set adrift by a process of closure of the congenital cleft.

XIII.—Dr. A. ALT, St. Louis. **A case of sympathetic ophthalmia, due to glioma retinae in the fellow eye.** The patient, a child of five years, had one year previously had the left eye removed because it was blind and a source of irritation to the right eye. There were well marked symptoms of sympathetic ophthalmia with blindness in the right eye, but in the course of eight months it improved under treatment by mercurials and iodides so that he could count figures at eight feet. In a short time two small growths appeared in the left orbit. Examination of these as well as of the enucleated globe, which was obtained, showed in both gliomatous tissue.

XIV.—Dr. B. L. MILLIKIN, Cleveland. **A case of spontaneous rupture of the eyeball.** The patient, a woman aged sixty-eight years, had for some time suffered from severe neuralgic pains in the head. There was rapid loss of vision, and she has been blind since '96. Both eyes were stony hard. On January 4, 1898, while sitting quietly in her own room she had an attack

of pain in one eye, followed immediately by profuse hemorrhage, the blood flowing freely down her face. Examination showed a rupture nearly vertical through the centre of the cornea from the lower margin of the pupil upward into the sclera. It seems to have been a spontaneous rupture of the weakened walls due to the extreme tension.

Adjournment.

Afternoon Session.

XV.—Dr. W. F. MITTENDORF, New York. **Multiple rupture of sphincter of the iris, with subsequent development of myopic astigmatism.**

The man was accidentally struck in the eye by a stone, and, as a result of the injury, had six distinct ruptures of the pupillary border. After these had healed, a refraction examination disclosed a myopic astigmatism of 3 D, with the axis of the cylinder in the direction of the most pronounced rupture. Previous to the injury the eye had seemed to be normal, and at the time of the examination the Javal ophthalmometer showed a normal cornea, so that the astigmatism must have been lenticular.

XVI.—Dr. LUCIEN HOWE, Buffalo. **Normal pupillary reaction, with microscope for its measurement.**

In all measurements of the pupil there are, of course, two factors in the problem: the pupil itself and the instrument with which it is measured. The variations of the former and the imperfections of the latter constitute the difficulties of the problem. The absolute size of the pupil is of comparatively little importance, ranging from an average of 4 mm in early life to about 3.5 mm in later life. Concerning the causes which produce changes in the size of the pupils, these are: first, intensity of light; second, accommodative effort; and, third, respiration and circulation. A fourth element, the psychic, may also play an important part. The best form of instrument for measuring the pupil is that in which the scale is fixed in the tube of a microscope or a telescope. The one exhibited gives a great amplification with a flat field, and the slightest variation in size can be easily detected and measured.

XVII.—Dr. R. L. RANDOLPH, Baltimore. **The value of acoin as a local anæsthetic in eye surgery.**

Dr. RANDOLPH referred to Trolldenier's recent report of experiments upon rabbits with acoin, the new anæsthetic, and reported upon his own use of it in the human eye. He had tried

it for the removal of foreign bodies, pterygii, tarsal tumors, etc., but did not find it in some respects as satisfactory as either cocaine or holocain. In those cases where there was much congestion, repeated installations were necessary to make the removal of a foreign body possible. The stinging sensation following its application was greater and its anæsthetic action slower always than is the case with either cocaine or holocain. A few bacteriological experiments seemed to show that it would destroy organisms after a short length of time, something under twenty-four hours.

XVIII.—Dr. C. H. WILLIAMS, Boston. **More uniform tests for vision, color sense, and hearing.**

In re-arranging the tests for one of the New England railroads, Dr. WILLIAMS found it necessary to have a new set of letters carefully drawn, so that the height of each letter should subtend the standard visual angle of five minutes, and the width of its component parts an angle of one minute. In order that these cards should be in portable shape, the letters were printed on cards three and a half by nine inches, and can be readily placed in an envelope and carried in the coat pocket. One line of letters only is printed on each card, and a different arrangement of letters for each of the required distances of twenty, thirty, or more feet, in order to prevent memorizing. Three cards contained printed representations of the ordinary semaphore arm signals, the length and width of the arms being the same as the height and width of the letters on the twenty-foot card, and when seen at a distance of twenty feet they correspond in size to the standard semaphore arm when seen at a distance of half a mile.

In regard to the color sense, Dr. WILLIAMS stated, as a general proposition, that no test for color perception is satisfactory unless it includes first a test by comparison of colors, the Holmgren worsted test being perhaps the best, and, second, a test with colored lights, in which the intensity of the lights can be varied and in which the names of the colors should be given by the person examined. Dr. WILLIAMS exhibited a lantern which he had devised for making this test for colored lights. It renders it possible to detect a very small central color defect which would not be noticed when testing with the worsteds, because their image would cover a larger area than that affected.

In order to give a more uniform test for hearing, a ratchet acoumeter was presented, which produces a series of sharp metallic sounds by simply turning the milled screw-head.

Concerning the use of spectacles by railroad employes, he says that there can be no objection to their use for reading train orders, etc., but for distant vision, and under all the varying conditions of weather, it will be found that when the need of assistance from the glass is greatest they will often be a hindrance rather than a help. The moisture condensing on the glass will obscure the vision, and the tendency will be to remove them and depend upon unaided sight.

XIX.—Dr. C. H. WILLIAMS. **A modified perimeter.**

This consists of the ordinary self-registering perimeter, with electrical attachments. A small incandescent light of $\frac{1}{2}$ -candle-power is used for fixation, and another is so attached to the movable arc, that it can, by pressing the button, be moved along this arc. The amount of light can be regulated by means of ground glass globes, and colored globes may be used for testing the color field.

Adjournment.

BOOK NOTICES.

(Continued from p. 376.)

XXVII. **Progressive Medicine, Vol. II.**—A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Octavo, handsomely bound in cloth, 472 pages, 56 illustrations, and 3 full-page plates. Lea Brothers & Co., Philadelphia and New York.

This volume, issued in June, 1899, contains, besides three other articles, one of 90 pages on ophthalmology, by Jackson. Instead of giving, as in the ordinary annual, the title and a disconnected, undigested abstract of every paper published, no matter how unimportant or misleading, the author here under each caption discusses from an intelligent personal point of view such recent contributions to the subject in hand as seem to him to be of actual importance. The result is a readable and judicious commentary on the recent progress of ophthalmology, the perusal of which will enable one with the least expenditure of energy to bring his ophthalmological information up to date. W. A. H.

XXVIII. **Die Sehleistungen von 50,000 Breslauer Schulkindern** (The Acuteness of Vision of 50,000 Breslau School-Children). Von Prof. HERMANN COHN, Breslau. 8vo, pp. 148. Schottlaender, 1899.

The very explicit directions given in this work for the guidance of those who may wish to carry on investigations regarding the vision of children and the changes incident to school life, deserve careful study on the part of such, for they have been formulated by a most experienced investigator. The results of the ocular hygiene which has been adopted in the schools of Breslau since he began his labors are surprising. He states that in 1865, when he exam-

ined 10,060 of the school-children of Breslau, 18.8 % of the boys and 14.3 % of the girls had some abnormality of the eyes, while in 1898 this was true only of 12.9 % of the boys and 12.8 % of the girls. As he says: "It would be the greatest triumph of ocular hygiene if a further decrease of ocular faults could be demonstrated from year to year."

A number of facts were elicited in the examination of this great number of children's eyes, and certain theoretical and practical deductions were made therefrom, some of which may be considered to be of major importance. The principal facts are as follows:

Nearly one half of the children could recognize in the open air a character supposed to be recognizable at not over 6 *m*, at distances varying from 7 to 12 *m*; over one third, 38 %, at from 13 to 18 *m*; 3 % at from 19 to 24 *m*; and 1 % at distances over 24 *m*, the greatest being 27 *m*. Recognition of this character at distances between 7 and 12 *m* was more common among the girls (55 % to 39 %), but between 13 and 18 *m* among the boys (56 % to 40 %). The 7 to 12 *m* vision was more common in the lower schools; the 13 to 18 *m* vision in the upper. The acuteness of vision of the healthy eye does not diminish in youth either from year to year or from lustrum to lustrum. The average vision is double that usually supposed. Vision less than normal was found in 9 % of the children of the lower schools, in 13 % of those in the middle, and in 17 % of the higher, the average being 10 %. Comparison of these figures with those obtained in 1865-66 shows that the number of school children with poor vision has been reduced one half in one generation, and that in the same time diseases of the eye have diminished 75 %.

It appears that a distinction should be made between vision measured in a room and vision measured in the open air, for of the 46,733 normal children the average distance at which a given character could be recognized was, in the open air, double what it was in a room.

It also appears that the angle half a minute is the smallest average visual angle, instead of 1' as heretofore supposed; and that the smallest visual angle may be very much smaller, as 194 children read No. 6 at from 21 to 24 *m*—*i. e.*, with a visual angle of 15 seconds.

Signs of much painstaking work are evident throughout the book, which will repay careful reading.

M. L. F.

MISCELLANEOUS NOTES.

PRIZE ESSAY.

The Alvarenga Prize of the College of Physicians of Philadelphia has been awarded to Dr. ROBERT L. RANDOLPH of Baltimore, for an essay entitled "The Degeneration of the Crystalline Lens. An Experimental Study."

Obituary.

ALFRED GRAEFE, cousin and pupil of Albrecht von Graefe, and Professor of Ophthalmology at Halle from 1867 to 1892, died at Weimar on April 19th at the age of sixty-eight. He was an active worker and a frequent contributor to ophthalmological journals, but his name, doubtless, will chiefly be remembered in connection with the *Handbuch der gesammten Augenheilkunde*, edited jointly with Saemisch, and with his own article on disturbances of mobility in that work. His last literary labor was the revision of this article for the new edition of the handbook now going through the press.

Contents of the last numbers of the Archiv für Augenheilkunde (German Edition of these ARCHIVES).

Vol. XXXIX., No. 1. Issued April, 1899.

1. AXENFELD and BUSCH (Rostock). A contribution to the symptomatology and histology of primary myxosarcoma of the optic nerve and on its operative removal by Krönlein's method.

2. SICHERER (Munich). Investigations on the sterilization of India ink for tattooing the cornea.

3. SCHULTZ (Berlin). Clinical contributions to purulent keratitis.

4. FUKALA (Vienna). Refraction among the ancients (translated).

5. WALTER (Odessa). Follicular conjunctivitis and trachoma (translated).

6. KIRIBUCHI (Tokyo). On Fuchs's peripheric atrophy of the optic nerve.

7. DUFOUR (Lausanne). On a subconjunctival angio-fibroma of the intrinsic muscles with hyaline degeneration.

8. WOLFF (Berlin). On the operation for securing the mobility of artificial eyes and its partial replacement by a new eye of peculiar form (translated).

9. ABELSDORFF (Berlin). Translation of the original articles of the English edition of these ARCHIVES (ARCH. OF OPHTH., xxviii., 1).

Systematic Report, 4th quarter, 1898, continued (translated).

Vol. XXXIX., No. 2. Issued June, 1899.

10. SCHWEIGGER (Berlin). On the technique of advancement in squint operations (translated).

11. A. H. KNAPP (New York). A case of chronic empyæma of the frontal and ethmoidal sinuses with exophthalmus; operation; recovery.

12. GELPKE (Karlsruhe). On homonymous hemianopsia of cortical origin, with peculiar disturbances in the remaining halves of the visual fields.

13. DOLGANOFF (St. Petersburg). On the pathological anatomy of glaucoma.

14. HOLDEN (New York). The pathology of experimental quinine amblyopia.

15. R. D. COHN (San Francisco). On herpes zoster ophthalmicus. A clinical study.

16. WILBRAND (Hamburg). On relaxed hysterical ptosis.

17. HOLMES (Cincinnati). Extirpation of the lachrymal sac and glands.

18. JAESCHE (Dorpat). On binocular vision.

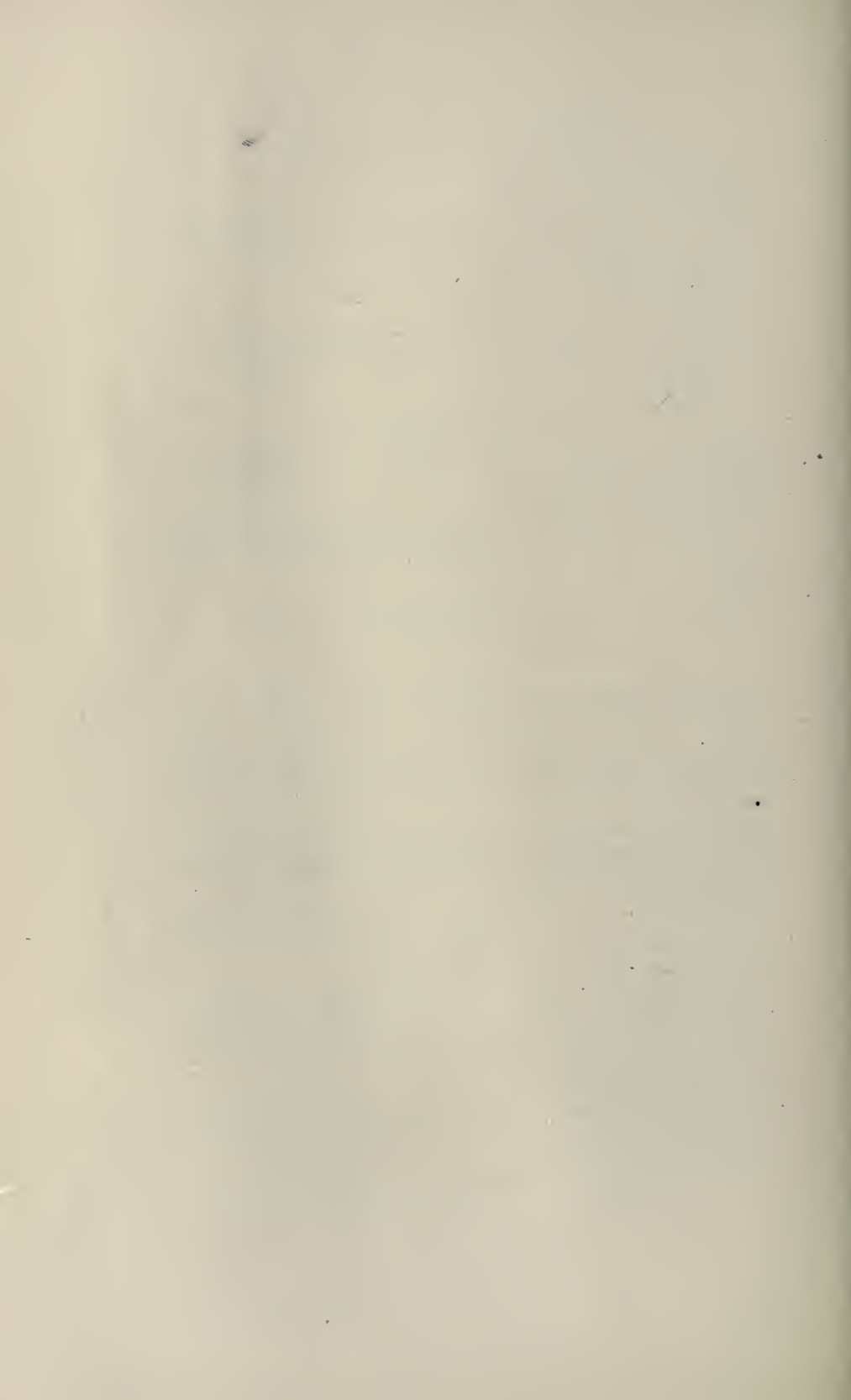




Fig. 1.

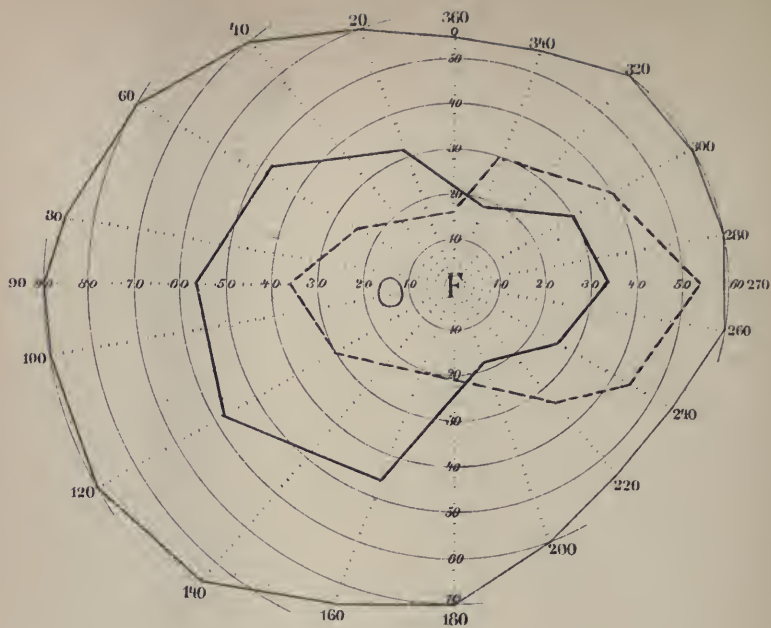


Fig. 3.

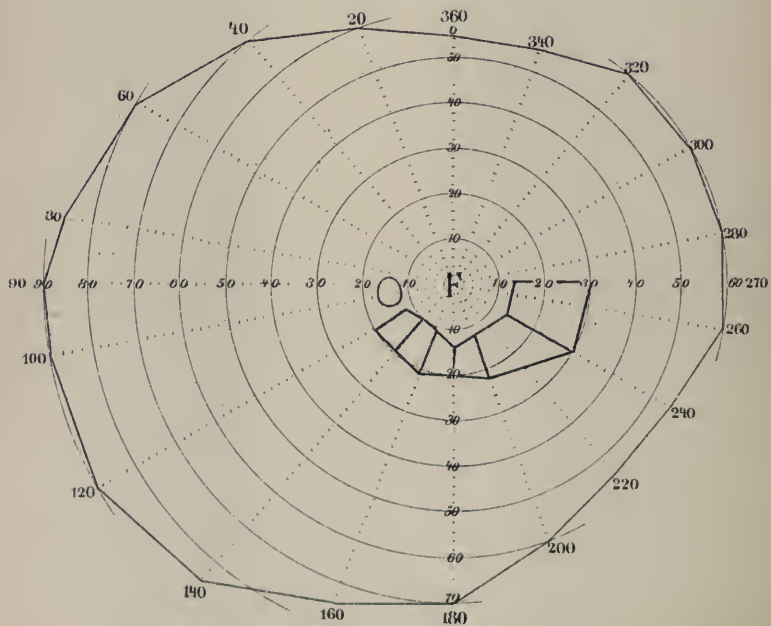


Fig. 2.

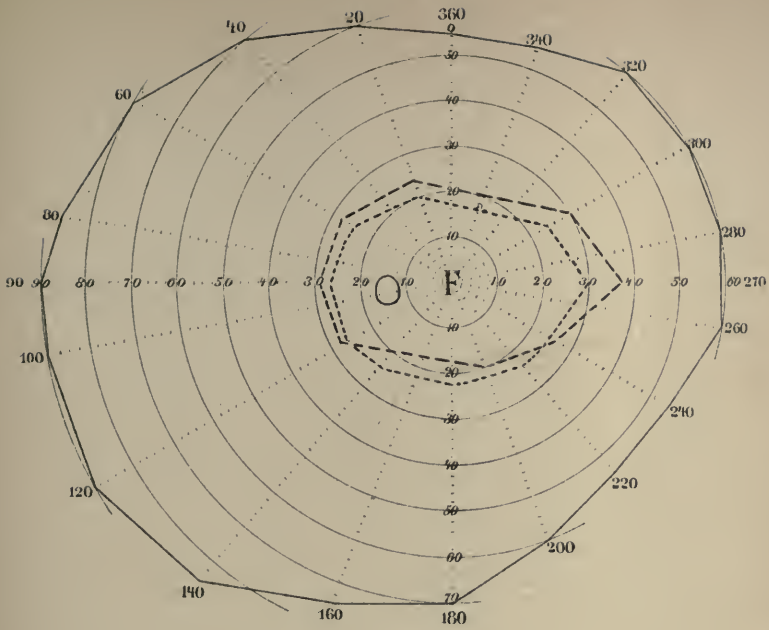
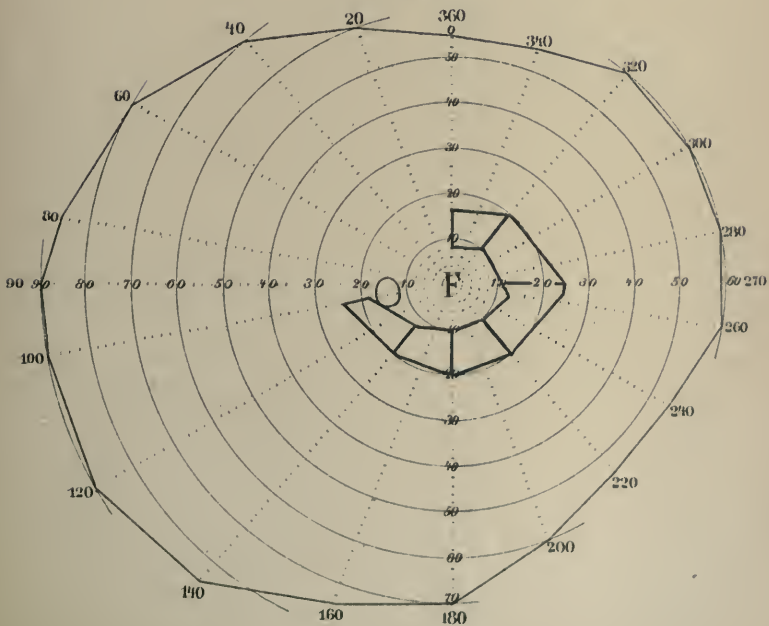
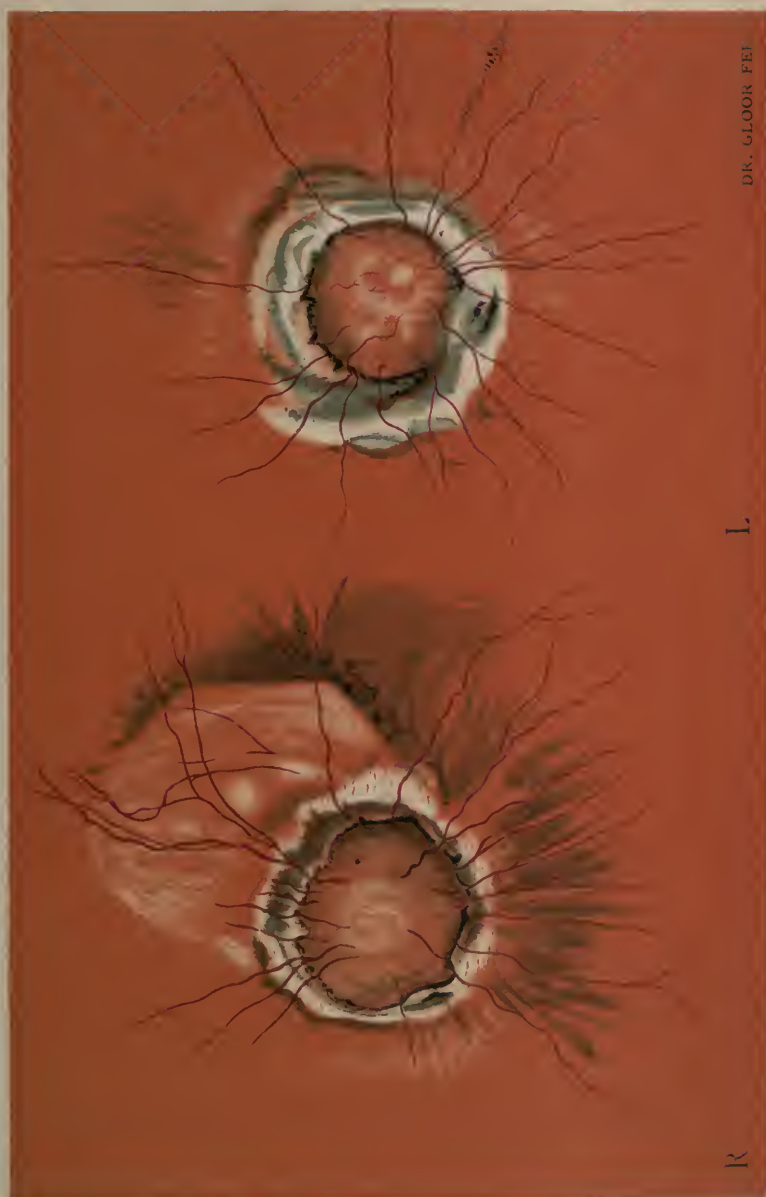


Fig. 4.





DK. GLOOR FEF

ARCHIVES OF OPHTHALMOLOGY.

EYE STRAIN IN ITS RELATION TO THE VERTICAL CENTRATION OF LENSES.

BY BURTON L. DUNN, B.S., M.D., SYRACUSE, N. Y.,

EX-HOUSE PHYSICIAN AT THE POST-GRADUATE HOSPITAL, NEW YORK.

IN a considerable class of eye cases, notwithstanding the most careful correction of the patient's ametropia under a mydriatic, his asthenopia still persists. Such a patient commonly undergoes a tenotomy, wears prisms, or goes through a course of muscular prismatic exercise, as the particular belief of his oculist dictates.

It seems pertinent to inquire in this connection whether such methods of treatment are always necessary, or whether the persistent asthenopia may not, in many of these cases, depend upon some unrecognized source of strain present in the correcting lenses themselves.

It is somewhat remarkable that in the literature of refraction there seems to be no adequate recognition of the important part which the centring of lenses plays in relation to vertical strain. Most works on this subject contain warnings as to the dangers of lateral decentration, but the subject of vertical centration receives comparatively little attention. While it is true that De Schweinitz (and possibly others) recommends that the centres of reading-glasses be lowered 5 mm, glasses for constant wear are centred for the far point without due weight being given to the fact that the patient reads, normally, through the lower part of his glasses, usually at a point about 10 mm below their centres, and that only by holding the print far upward or by bending the head downward in an extremely awkward way can the reading-line of vision be made to pass through the optical centres of such glasses. It is also true that, even if it were possible to maintain these awkward positions, they cause an increased

accommodative effort (as pointed out, I believe, by Dr. Duane), since the position of least accommodative effort corresponds to the lower visual plane. As glasses for constant wear are usually arranged, then, there is virtually an equal decentration of both lenses above the reading-point.

In an investigation as to the optical effect of equally centred lenses, it is evident that three refractive errors may result :

(1) An astigmatic error resulting from the oblique course of the visual rays through the periphery of the lens. This may be combined with

(2) A prismatic error equal in both eyes; or (and most important):

(3) In unlike lenses, an unequal prismatic error.

In considering the effect of these different refractive errors at the reading-point, it is difficult to say just what is the degree of relationship of the astigmatic error to the production of eye strain, as it is always combined with at least one of the forms of prismatic error. It seems probable, however, that, in the case of strong lenses, it may produce asthenopic symptoms, since in cases under my observation blurring and eye strain present when only one eye was used have disappeared on lowering the optical centre of the correcting lens to the reading-point. In practice it is true, however, that many of these patients rid themselves of their reading astigmatic error by tilting their lenses.

The equal prismatic error rarely gives great discomfort. Still, with strong minus lenses, equivalent at the near point to prisms base down, there is sometimes discomfort. I have met with patients who were unable to tolerate prisms of even one degree base downward, while prisms of much greater strength were well borne when reversed.

The greatest percentage of eye strain is of course shown in those cases in which there is an unequal prismatic effect at the near point. The number of such cases is comparatively great, since such a prismatic error occurs at the reading-point (in greater or less degree) in all cases of unequal refraction corrected by unlike lenses as usually centred (with the exception of astigmatic lenses, at or near the vertical axis).

From the table given by Dr. Maddox it is easy to compute the strength of the unequalized prism in any given case, depending as it does upon the difference in strength of the lenses worn and upon the amount of decentration. If, for example, the reading-point is 10 *mm* below the optical centre of the lenses, and their difference in strength is one diopter, an unopposed vertical prism of about $\frac{1}{2}^{\circ}$ results at the near point. It is interesting to note that in this class of cases nearly all patients respond to the tests for vertical insufficiencies, and in such a manner as to suggest a causal relationship between their muscular imbalance and the constant prismatic strain to which they are exposed in reading. The weak muscle in such cases is usually found to be that opposed to the stronger prism, *i.e.*, the one toward which the prism apex points. It would require an analysis of a large number of these cases examined for vertical deviations, both before and after the long-continued use of ordinary correcting lenses, to establish any absolute law of causation; moreover, its deductions would be liable to vitiation by the presence of an *anatomically* stronger vertical muscle, yet such a relationship is sufficiently common to lead often in practice to the more or less perfect correction of a reading *prism-imbalance* by prisms prescribed for the correction of a distant *muscular imbalance* only.

I have reported such a case in another part of this paper, also a very instructive case in which a patient's manifest orthophoria changed while under my observation under the use of a reading-prism to a manifest hyperphoria exactly corresponding in degree and direction to the prism used.

It is now necessary to consider the various methods by which these refractive errors at the reading-point may be corrected. In common practice they are usually corrected either by a vertical prism or by tenotomies, and if the vertical muscular imbalance exactly corresponds, as pointed out above, in kind and degree to the unequal prismatic error at the reading-point, prisms often give good results. This fact perhaps accounts for the many satisfactory results seen in prescribing vertical prisms, but such perfect correspondence must be rare.

If the problem is attacked from the side of the lenses themselves, it is of course possible to give perfect reading prism-balance in every case by neutralizing the unequalized vertical prism by an adverse prism of equal strength. Such a correction, however, does not always give perfect relief, since with strong lenses an astigmatic and equal prismatic error remains to cause discomfort.

A still less satisfactory method of treatment, yet a common one, is by a tenotomy of the *functionally* strong muscle. This often gives temporary relief, since an artificial muscular imbalance is produced which tends to counter-balance the prism at the near point. Unfortunately the good effect of this measure is usually of short duration, since the reading-prism is not itself affected, and continues as a source of muscular strain.

The most effective method of correction in these cases is the decentring downward of both lenses to the reading-point, thus eliminating both the astigmatic and prismatic errors. These errors, it is true, are transferred *reversed* to distant vision, but they are here partially overcome by an altered position of the head, and give little trouble. It might be urged that it is the reversed position of the prism, tending, as it does, to correct the muscular imbalance usually shown in these cases (as pointed out above), which gives the relief experienced, were it not for the fact that such patients are even *more* comfortable in bifocals, containing the same correction in both segments, and having, of course, separate centres for distance and reading, than in their decentred lenses.

Theoretically such bifocals are the ideal correction for this class of cases, as they eliminate the astigmatic and also all vertical prismatic errors; practically, however, they are usually unnecessary, the patients doing sufficiently well in their decentred glasses.

ILLUSTRATIVE CASES.

CASE I.—Astigmatic and equal prismatic error at the reading-point.

Mrs. A. B., aged twenty-six, complained of blurring of print and discomfort in reading. Was wearing — 2.c ax 180° each

eye. She showed vertical orthophoria, and exophoria 1° . Under homatropine, refraction remained the same, viz., — 2.c ax 180° each eye.

The lenses which she had been wearing proved to be equivalent at the near point to prisms of 1° base down. They also considerably increased the astigmatic correction. I gave the same lenses decentred downward to the reading-point. She has since reported entire comfort.

CASE 2.—Unequal prismatic error.

Mr. C. D., aged twenty-seven. Patient complained of great discomfort in reading, but of none in distant vision. His refraction had been corrected by two different oculists within a year, and he was then wearing O D — .75 + 1.25c ax 90° ; O S + 1.c ax 90° $\ominus \frac{3}{4}^{\circ}$ prism base up.

The patient had greater discomfort in reading since visiting the last oculist, who added the prism to his correction. An analysis of his lenses showed that they were equivalent to a prism of about $\frac{1}{2}$ degree, base down over right eye, at the reading-point, while over the left eye was the added prism of $\frac{3}{4}$ of a degree, base up. The whole unequal prismatic correction at the near point was then $1\frac{1}{4}$ degrees.

Muscle tests showed right hyperphoria $\frac{1}{2}^{\circ}$ lateral orthophoria. His refraction remained the same under homatropine, viz.,

O D — .75 \ominus + 1.25c ax 90° ; O S + 1.c ax 90°

I discontinued in this case the prism over the left eye and decentred the right lens (which alone produced any prismatic effect) downward to the reading-point. The results were most gratifying. The patient has since been absolutely comfortable both for near and far work. The muscle tests, as I found them, were in this case such as to lead one to increase the unequal prism at the near point, as had been done by the previous oculist. Possibly this anomalous muscular condition was due to the continued use of the prism over the left eye, or it may have been originally present. At any rate the case is of interest as showing the good effect of prism-balance at the near point, even when the muscle tests are adverse.

CASE 3.—Unequal prismatic error, combined with an astigmatic and equal prismatic error at the reading-point.

Miss E. F., aged twenty, a schoolgirl. This patient's refraction of O D — 1.75, O S — 4. was corrected by an oculist, who

told her at the time that she had perfect muscle-balance. She wore her correction for some time with comfort, and then returned complaining of headache and great discomfort in reading. She then manifested a right hyperphoria, and a tenotomy was done on the right superior rectus, giving her great temporary relief. About six months afterward her headache and asthenopia reappeared, and it was impossible for her to read without great discomfort. She now consulted another oculist, who gave her considerable relief by prescribing vertical prisms. When she came under my care she still complained of some discomfort in near work. I was greatly interested in this case to find that the prism which she was wearing almost exactly neutralized her unequal lens prism at the near point, but an equal prismatic effect of about 1° , base down, with a considerable astigmatic error, still remained. I had both lenses decentred down to the near point, and the patient now reports herself to me (after a year) as having been perfectly comfortable since.

CASE 4.—This case is of interest as showing the slight benefit received from repeated tenotomies and the great relief after decentring the lenses.

Mr. H. I., aged twenty-seven, student. Patient had compound myopic astigmatism of right eye; mixed astigmatism, left. He suffered constantly from asthenopia in reading, even after his refraction had been corrected. He now consulted a second oculist, who found left hyperphoria and tenotomized the right inferior rectus. His asthenopia still persisting, he sought another oculist, who found more left hyperphoria and also lateral insufficiencies. He was again thoroughly tenotomized until the tests showed a practical orthophoria, but with little relief to his asthenopia. He came to me complaining that he was unable to read more than a few minutes at a time without the print doubling and blurring. His refraction was as follows: O D — .50 — 2.75c ax 180° ; O S + .50 — 2c ax 10° . Vertical orthophoria, and exophoria 2° .

The unequal prism imposed by these lenses at the reading-point was about 1° , base downward, over the right eye. He also had a comparatively large astigmatic and equal prismatic error, to which he was very sensitive, as shown by the fact that a neutralization of his unequal prismatic error did not give him full relief.

He experienced, however, almost perfect relief on decentring both lenses to the reading-point, and was very comfortable for

several months afterward, but as he found that a change of occupation, requiring a great deal of near work, caused a slight return of his asthenopic symptoms, and, as he had deficient accommodative power, I gave him bifocals, with weak plus glasses and converging prisms in the lower segments. Under this correction he has since been very comfortable.

CASE 5.—The following case shows in an interesting manner the transition from orthophoria to heterophoria under a reading prismatic strain.

Miss Z., aged seventeen, a working-girl, for a number of years has had great discomfort in reading, but has never worn glasses. V: O D $\frac{2}{4}$ °; O S $\frac{2}{8}$ °; orthophoria. Under homatropine $\frac{2}{8}$ w O D + 1. + 2.c ax 90°; O S + 4.50c ax 90°.

Thinking it of interest to discover whether any heterophoria or discomfort would result from the comparatively small degree of unequal prismatic strain (equivalent to between $\frac{1}{2}$ and $\frac{3}{4}$ of a degree) produced at the reading-point by these lenses, I did not have them decentered. I was somewhat surprised by her return a few weeks later, complaining of discomfort, confined entirely to reading and the near use of her eyes. She now disclosed $\frac{3}{4}$ ° of right hyperphoria.

I decentered the right lens to the reading-point and she at once experienced entire relief.

It would seem from a study of these cases that the ordinary method of lens centration tends to give rise to a class of pseudo-insufficiencies which complicate the already difficult problem of muscle-balance. The whole matter of the relation of the muscles to vertical prism-imbalance at the near point deserves still more study; and it is my hope that by calling attention to the possibility of such pseudo-insufficiencies, further work may bring out much which may prove of advantage to students of the ocular muscles.

SOME AIDS IN OPHTHALMIC TEACHING.

BY PROF. F. DIMMER, INNSBRUCK.

Translated by Dr. MATTHIAS LANCKTON FOSTER, New York.

(With six figures in the text.)

I HAVE tried to arrange the instruction in my clinic so that all hearers could follow the demonstration of pictures, anatomical preparations, etc., for there can be no doubt that thus the purpose of the teaching is to be best accomplished. If pictures or preparations are handed about during the lecture, the attention of the student is of necessity divided: either the object circulating for observation will not be properly considered, or a part of the lecture will be lost. If the material referred to is demonstrated to the students in groups, as is necessary with regard to certain objects, the demonstration is to a small number at the expense of an enormous loss of time, not to mention that during this time the larger number of students are unoccupied. The words of the speaker should produce a steady, active connection between the objects demonstrated and the minds of the hearers, and this is possible only when the teacher can show during the lecture objects illustrative of his words visible at the same time to all. I present here no new discoveries, and it is possible that in one or another clinic similar arrangements exist, but as I know that in the majority of eye clinics the teaching is not conducted according to the above-mentioned principles, I have determined to describe the apparatus used in my clinic.

I. A SKIOPTIKON.

It is more necessary than in any other branch of medicine

to exhibit microscopical preparations to the students in ophthalmology. Both the physician and the surgeon can refer in their lectures to books and demonstrations of pathological anatomy, but the ophthalmologist cannot do this, because in the works of pathological anatomists the special pathological anatomy of the eye is treated of, either not at all, or at least very incompletely, while a knowledge of it is necessary for understanding the process of disease, for making a diagnosis, and for correctly performing operations on the eye.

Microscopical preparations may be demonstrated either with the common microscope as an adjunct, or with the demonstration-microscope as an accompaniment to the lecture, but neither of these methods can compare with the projection of such on the wall by means of the skioptikon, so that the teacher can indicate with a rod each portion separately to his hearers. The skioptikon can also easily be used for the projection of schematic drawings, pictures of cases of disease, and ophthalmoscopic plates.

The commonest form of skioptikon is fitted up with electric light, and projects on the wall objects in their natural colors, but the cost of such an instrument is so great as to form a serious obstacle to its introduction into the eye clinic, at least here in Austria. I have therefore endeavored to construct the cheapest possible skioptikon which will suffice for the demonstration of the pathological histology needed by the teacher of ophthalmology for the purpose of the clinic, and for this purpose a low power of enlargement is most useful to illustrate the topographical changes in the various diseases of the eye; the higher powers of enlargements are less frequently of service.

Instead of the electric light the calcium light of Drummond or the zircon light may be used, but the first, the handling of which requires care, is inferior to the electric light, and I am convinced that the zircon light, the management of which is rather difficult and costly, is no more effective than Auer's gaslight,¹ which I have adopted. The skioptikon as constructed by me (Fig. 1) consists of a wooden

¹ Similar to our Welsbach light.—Transl.

box, lined with asbestos, 34 *cm* long, 30 *cm* broad, and 40 *cm* high, with a chimney of sheet-iron. Within the box

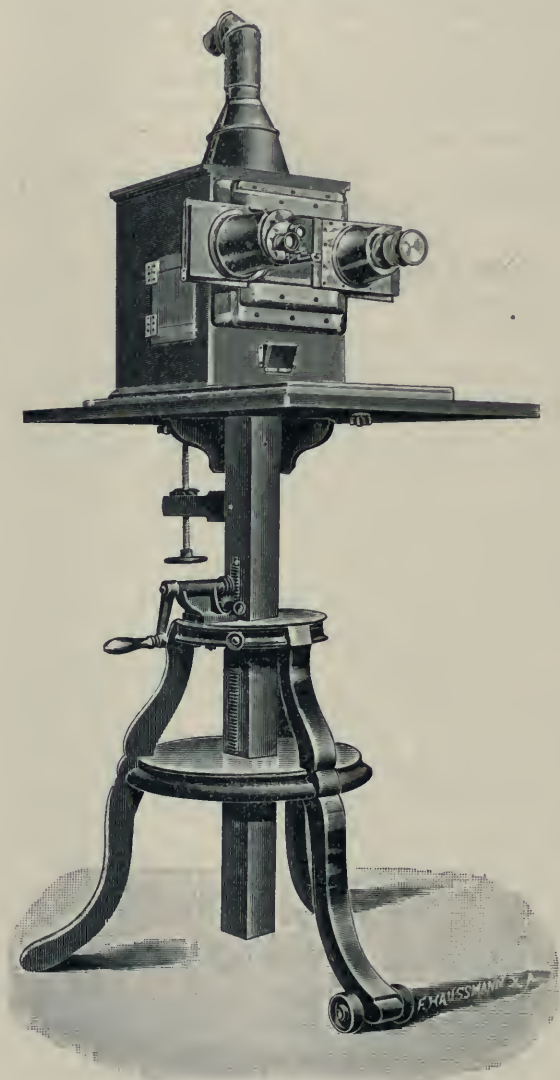


FIG. 1.

an Auer's burner is so fastened as to be movable forward and backward from the centre, and also, by means of a screw,

upward and downward. On the posterior wall of the box is a metallic concave mirror. The interior is reached through two lateral, barred doors.

On the anterior wall are lenses, 10 *cm* in diameter (see Fig. 2, a, which represents a horizontal section of the skioptikon), in front of which on the anterior surface of the box are horizontal, grooved cleats to permit a board 45 *cm* long to slide in front of the lenses. In each half of this board is an opening 10 *cm* in diameter. Before one a skioptikon objective is placed (c), behind which is a space for the introduction of glass plates (d); before the other (e) is a tin tube 14 *cm* long, which becomes narrower as it extends forward and presents in its smaller end an opening 30 *mm* in diameter, with a diaphragm (f) capable of reducing its size to any degree required between 30 and 5 *mm*. In front of this is a bracket

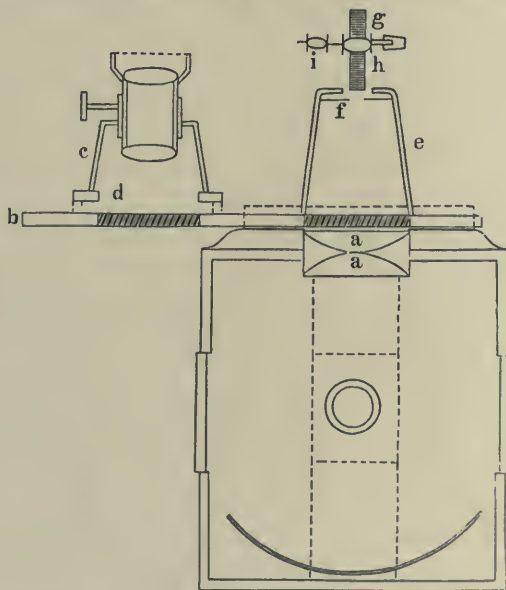


FIG. 2.

for the insertion of microscopical preparations. From the lower margin of the tube projects a toothed bar (g), on which a perpendicular metal plate is moved by a rack and pinion. This has two openings, 22 and 28 *mm* in diameter, in which two magnifying lenses (h and i) can be inserted. By a single

motion of the metal plate about an excentric fixed point, first one, then the other magnifying lens can be brought into use. I have used Edinger's apparatus for projection and delineation, and find that with the large opening they give very luminous pictures, although not quite free from spherical aberration.

The cost of this skioptikon, made according to my directions by C. Reichert in Vienna, VIII., Bennogasse 22, is 216 marks. It can be mounted on an ordinary photographic stand (see Fig. 1) at an additional cost of 43 marks.

The skioptikon is placed at a distance of rather more than two metres from a white paper stretched over a frame one and a half metres square, and then with the weaker lens sections of the entire globe, magnified to a metre in diameter, can be projected upon it. The intensity of the illumination is sufficient to permit the recognition of details at the distance of seven metres, although their outlines are not quite sharply defined, a fact which, in my opinion, is of no consequence, because the pictures are intended to be viewed only from a distance, and also because the grosser proportions alone should be shown in this manner. Thus can be demonstrated all of the topographical relations of the eye for which the weakest powers of the microscope would be used, as well as longitudinal sections of the optic nerve enlarged sufficiently to show the outlines of a glaucomatous or of a physiological excavation, or of a choked disc, the diameter of the papilla being about ten or eleven centimetres. Of late I have seldom used the stronger magnifying lens, because it is more convenient to have the skioptikon stand always in the same place, and when this lens is used the delineations on the wall will be indistinct unless the instrument is moved; but it is of value in certain cases.

For all conditions, whether normal or pathological, a sufficient enlargement of which cannot be obtained by means of these magnifying lenses, as where the visibility of cells or of collections of cells is in question, positive phototransparencies from microscopic preparations may be employed, inserted behind the skioptikon objective in wooden frames 8 *cm* square. The change from the projection of

microscopic preparations to that of these photo-transparencies is accomplished very quickly by simply shoving the above-mentioned board (Fig. 2, b), so that, if needed, microscopic preparations and photographic transparencies may be exhibited in turn. (In Fig. 2 the board is placed as if for the employment of microscopic preparations.) Beside these photo-transparencies of microscopic preparations I have a large number of others of the normal and pathological anatomy and histology of the eye and of the nervous system, schematic drawings, etc. When the instrument is situated two metres from the wall the size of the reproductions of these pictures is from 100 to 115 *cm*.

It is hardly necessary to say that in my lecture-room are a number of large charts hanging on the wall, to which reference is often made to illustrate the most important relations of the eye. They are seven in number, 115 *cm* long by 75 *cm* broad, with lettering large enough to be easily read at a distance of seven or eight metres. They represent: 1, the normal meridional section of the eye; 2, the distribution of the blood-vessels in the eye according to Leber; 3, a vertical section of the upper lid; 4, a longitudinal section of the optic nerve, and also the ophthalmoscopic picture of the papilla; 5, an antero-posterior section through the orbit and the globe; 6, the anatomy of the orbit in three pictures—(a) the muscles, (b) the vessels, (c) the nerves; 7, a horizontal section through the globe and orbit. But to make all the pictures which are needed of like size to hang on the wall would occasion great expense, while they could not all be hung at once on the walls of the lecture-room, but would have to be kept in cases and brought out when desired. Positive photo-transparencies, on the contrary, cost very little and serve the purpose quite as well.

To make those photo-transparencies I use the following simple apparatus, which, adjusted much after the manner of the ordinary microphotographic apparatus, has the advantage that it can be used for the taking of microscopic preparations and also, with certain modifications, of pictures.

A vertical board 30 *cm* high, with a square aperture in its middle 54 *cm* across, is fastened 94 *cm* from the

end of a horizontal board 178 *cm* long (Fig. 3). Behind this vertical board the bellows of a camera, which when fully extended measures 85 *cm* in length, is placed. In the square aperture is inserted a little board carrying an objective and bound with a short tube of black cloth. The other portion of the horizontal board has a cleft which extends almost its entire length, wherein may be placed: 1, a board to which is to be screwed the stand of a microscope; 2, an Auer's gaslight burner; 3, a vertical board 31 *cm* high, 24 *cm* broad, secured to a small horizontal board.

To photograph a microscopic preparation, the stand of the microscope thus placed is secured near the vertical fixed board. Its tube, which must be blackened on its inner surface, or be lined with a tube of velvet, in order to avoid disturbing reflexes, is then inserted into the little black cloth tube attached to the little objective board and then wrapped about if daylight be present. Between the gas-burner and the microscope an illuminating lens of 10 *cm* focal distance is placed. A green glass is then inserted behind the diaphragm and Hartnack's objective, either No. 2 or No. 4, may be used. If the former is chosen, Abbe's apparatus is not used and the aperture in the diaphragm is made 2 or 3 *mm* in diameter; while if the latter is chosen the Abbe is used, its lens placed about 5 *mm* from the preparation, and the aperture in the diaphragm is still further reduced in size. The time of exposure in either case is the same. I have always used the orthochromatic eosin plates, which last well.

When it is desired to photograph a picture, the microscope, illuminating lens, and gas-burner are removed, and in place of the little objective board with the black cloth tube another little board of the same size carrying a photographic objective is inserted in the upright board (Fig. 4). I use the anastigmatic objective of Zeiss Ser. II. a, No. 2. The object to be photographed is now attached to the movable upright board. Such plates and books as are of sufficient size, about 24 *cm* broad, can be fastened directly to the board by means of binding-screws, while for smaller ones I have used the following means: A drawing-board

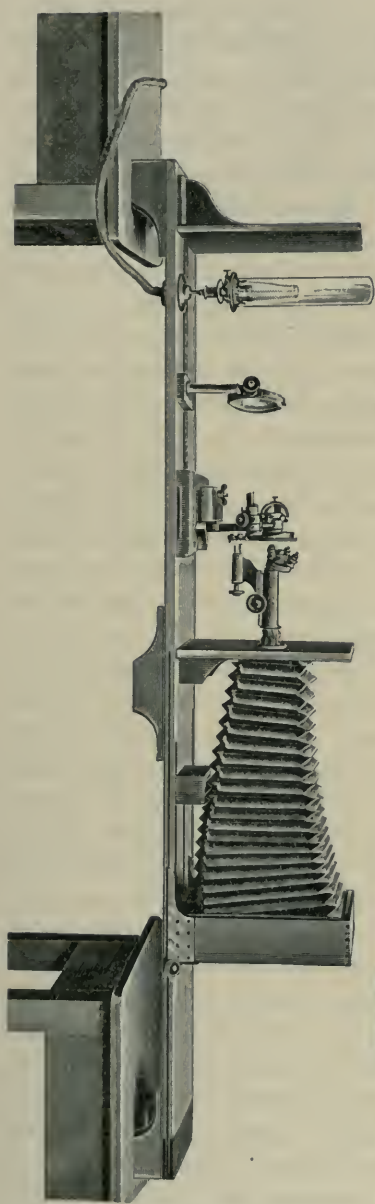


FIG. 3.

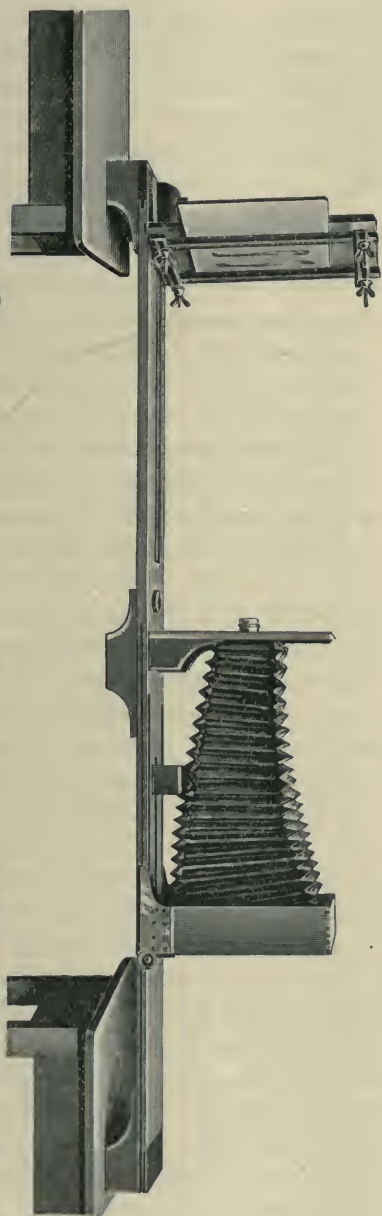


FIG. 4.

40 *cm* by 30 *cm* is secured to the upright movable board by means of a screw and nut. A frame of four bars is attached to the drawing-board by four binding-screws which pierce their points of intersection, and by this frame the book is clamped firmly in place, as may be seen in Fig. 4. As the drawing-board is bound fast to the movable vertical board, the object to be photographed can be moved along the cleft in the horizontal board as desired, and the objective placed at a greater or less distance from it so that enlargements or reductions can be satisfactorily obtained. Thus pictures of the size of those in Becker's atlas of the pathological anatomy of the eye can be reduced to the size of 8 *cm* by 8 *cm*, while by extending the bellows of the camera small objects may be enlarged to the same size.

In order to use the apparatus for other purposes, such as making enlargements and photographing patients, the plate-holders are changed so that plates 13 by 26 *cm* can be used as well as those 8 by 8 *cm*. If it is desired to make photographs of only the smaller size, this part of the apparatus may be made correspondingly smaller.

The apparatus, without the Auer's light or illuminating lens, may be obtained from R. Goldmann, manufacturer of photographic apparatus, Vienna, IV., Victorgasse 14, for 46 marks, and can easily be adapted to any microscope stand.

The negative is almost always strengthened with a solution of corrosive sublimate and the photo-transparency prepared by laying the negative on the chlor.-brom.-diapositive plate of Schattera and exposing it for from 15 to 25 seconds in the dark room to the light of a 16-candle-power light placed at the distance of half a metre. It is then developed and covered with a thin solution of xylol to neutralize any defects in the plates. Finally, over the photo-transparency is placed a cover-glass, separated from it by the interposition of strips of paper, and then the margins of both plates are bound with paper pasted about them. Reckoning the expense of the chemicals, which is very slight, a completed photo-transparency costs 15 kreutzer, or 6 cents, while a large chart to hang on the wall and serve the same purpose would cost from thirty to fifty times as much.

For the representation of the fundus of the eye Malakoff has made ophthalmic pictures on glass, not for the purpose of projection, but to give them a greater degree of transparency and natural appearance; but as the production of such pictures is associated with great labor and expense, I have sought to find a simpler means. I first cut up a Jæger's ophthalmoscopic hand atlas, make the separate pictures transparent, and project them on the wall, the same as the microscopic preparations. To make them transparent they are first laid in 95 % alcohol, then in carbolxylol (acidi carbolic in alcoholis liquefacti 100 gr., xyloli 300 gr.); a rather syrupy solution of Canada balsam is then dropped on a glass plate in a skioptikon frame, 8 by 8 *cm*, and when the picture has become transparent it is placed upon this and the air bubbles are carefully removed by pressure. More Canada balsam is poured over the back of the picture until it forms a tolerably thick layer, and the plate is then laid in a horizontal position in a warm place until the balsam is perfectly hard. Short strips of thick paper are then glued to the four borders of the plate, and to these is glued a cover-glass of the same size as the plate, with great care that it does not come in contact anywhere with the layer of Canada balsam, because the least unevenness in this layer would cause reflection of the light and injure the luminosity at this place. Finally the margins are bound with paper as before. I have thus prepared and used all of the plates in Jæger's, and many in Haab's atlas.

As these pictures were printed with opaque colors some of them are naturally lost in the process of rendering the paper transparent, and in the projection most of the colors appear too dark, while many fail to appear at all, but the delineation remains perfect, so as to permit the easy demonstration of every detail. The fact that the original colors in the picture are changed or lost seems to me to be of little importance, for the object of their exhibition is not to take the place of ophthalmoscopic examinations, but only to serve as aids in the lectures. The true colors the student must learn by direct examination, for the best atlas cannot reproduce the same shade and transparency that is seen in

nature. In addition to this I have taken the precaution to have in the lecture-room all the plates from the atlases of Jæger, Liebreich, and Haab, framed and with the correct diagnosis written beneath, so that the students can study them before or after the lecture, or during the afternoon. After the demonstration of an ophthalmoscopic picture projected on the wall, I also invariably call the attention of the students to the plates hanging on the wall and recommend study of these additionally.

Some plates taken from other atlases which were too large to be used in this manner, or were printed on paper unsuitable to be made transparent, as those in Wecker and Masselon's, and Gowers's atlases, together with a part of the plates in Liebreich's atlas, were photographed and photo-transparencies prepared and projected.

At present, June, 1896, there are in use in my clinic 143 microscopic preparations and 361 plates suitable for projection, a number which naturally is being continually increased, divided as follows:

1. Microscopic preparations, 143.
2. Photo-transparencies from microscopic preparations, 105.
3. Photo-transparencies from plates, including preparations, schematic drawings, etc., 45.
4. Plates of the fundus of the eye: *a*, taken from ophthalmoscopic atlases and rendered transparent, 164; *b*, photo-transparencies from ophthalmoscopic plates, 47.

The gas is always lighted in the skioptikon before the lecture, as the newer pattern of Auer's burner is provided with a little adjunct whereby, when the cock is properly turned, the gas is allowed to burn in a minute flame, so that when it is desired to use the apparatus the lecture-room is quickly darkened by closing the shutters, the gas-cock is turned, and everything is ready. I set apart no special hours for the demonstrations, but use them in connection with the lecture or following the exhibition of patients.

Prof. Czermak of Prague has used a skioptikon like this for some time and is much pleased with it.

2. AN APPARATUS TO DEMONSTRATE THE COURSE OF THE RAYS OF LIGHT THROUGH LENSES AND IN THE EYE.

I have made two appliances to be attached to the skioptikon for the purpose of demonstrating the course of the rays of light, utilizing the well-known method of rendering them visible by means of smoke or of fluorescent liquids.

First, the board which carries the objective for the projection of transparencies and the magnifying lenses is removed, and its place supplied by a board with a round hole in its middle 55 *mm* in diameter, in which is a metal plate with a pear-shaped opening 15 *mm* long by 10 *mm* broad, covered with a piece of tissue-paper made transparent by treatment with Canada balsam dissolved in xylol. In front of this is placed a box 60 *cm* long, 12 *cm* broad and high (see Fig. 5), the lateral as well as the anterior and posterior walls of which are of glass. The latter also open as doors. A cleft runs longitudinally for almost the entire length of the upper wall of the box, while the floor is pierced in two places for the insertion of two tubes with mouthpieces. Just in front of the skioptikon the box is supported by a foot of the proper height, while its other end rests on a block of wood placed on a wooden box which stands in front of the skioptikon on a table of corresponding height (Fig. 5).

Two square little boards, somewhat smaller than the section of the box, are placed within, where they are held in position in the cleft in the upper wall of the box by means of clamps in such a manner that they can easily be moved backward and forward, as shown in section in Fig. 6, and may be withdrawn by turning them 90 degrees, until parallel to the cleft, and lifting them out. In the middle of each is a round hole 30 *mm* in diameter, beside which are clamps to hold lenses.

To demonstrate the passage of light through convex lenses, a 12 D lens is placed in the clamps of each of the two little boards above mentioned, a screen is made by covering a little frame with tissue-paper, all three are introduced into the box through the cleft in its top, and the box is then filled with cigarette smoke blown in through the rubber tubes.

A cloth folded several times may be laid over the top of the box to prevent the rapid escape of the smoke, but this is never really necessary, because a very small quantity of smoke will suffice to make the rays visible.

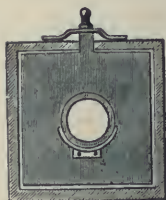


FIG. 6.

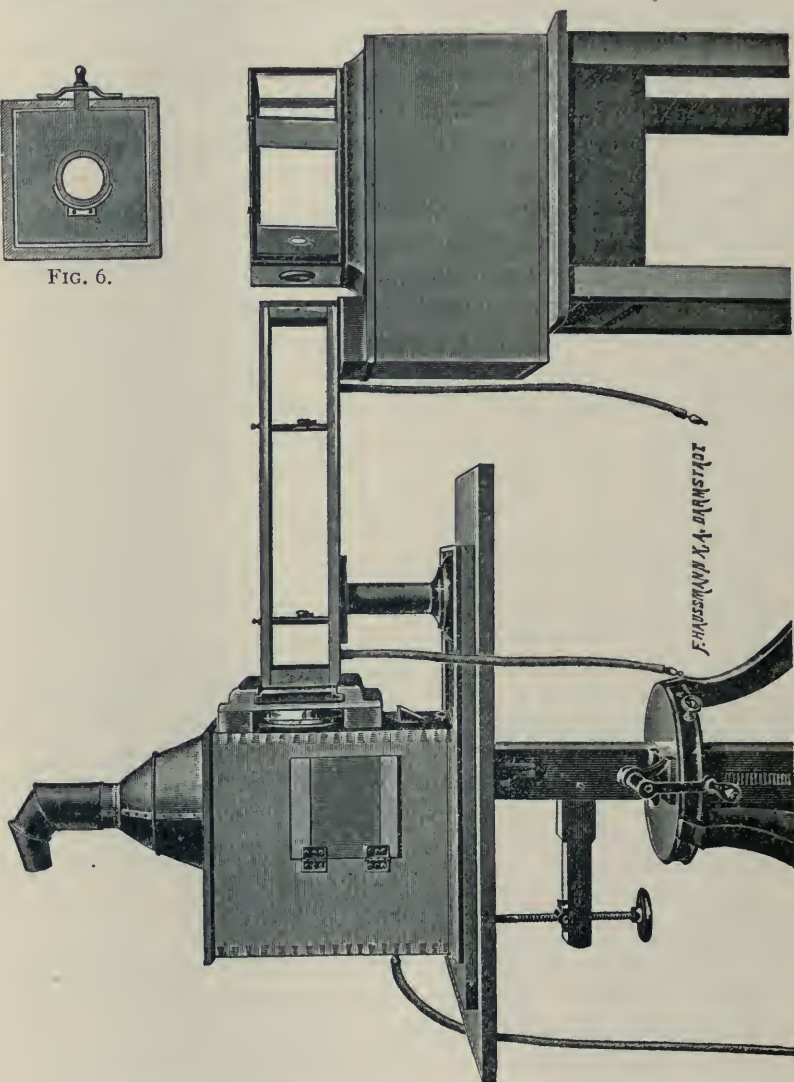


FIG. 5.

To show the manner in which parallel rays are focussed, a diaphragm of black paper with a pear-shaped opening is at-

tached to the lens nearest the skioptikon before it is put in position, and the lens is then placed at its focal distance from the opening in the skioptikon, which permits the exit of the rays of light. The parallel rays which emerge from this lens are united by the second into a focus on the screen, where the inverted image of the aperture in the diaphragm demonstrates the reduction and inversion of images thus formed.

The course of converging rays when refracted by a convex lens is shown by moving the first lens, with the diaphragm still attached to it, away from the skioptikon and bringing the second lens nearer to the first. The refraction of diverging rays which fall upon a convex lens is demonstrated by using only one lens, from which the diaphragm has been removed, upon which the diverging rays from the skioptikon fall.

Refraction through concave lenses may likewise be demonstrated by placing a 12 D concave lens in the second board and throwing upon it parallel rays from a 12 D convex lens in the first.

To the apparatus can now be added a tin box made to resemble the artificial eye of Kuhne, 30 *cm* long, 15 *cm* broad, and 15 *cm* high. At the end externally is a fold of tin in which is placed a glass plate, to which a watch crystal 7 *cm* in diameter and of 14 *cm* radius of curvature, filled with water, is fastened with Canada balsam. Within is a tin plate with a round hole 30 *mm* in diameter, hanging on two wires which rest on the sides of the box. Behind the central opening in this tin screen a 14 D lens is secured by a clamp, so as to represent the crystalline lens. A piece of ground glass, supported in the same way as the just-mentioned tin plate, serves to represent the retina. Fig. 5 shows the entire construction of the skioptikon and of the appliances just described.

After the tin box has been filled with water colored with uranin or fluorescin, so that the passage of the rays of light through the fluorescent water may be visible, axial myopia and hypermetropia may be demonstrated by moving the piece of ground glass which represents the retina backward and

forward, as well as the effect of a backward and forward motion of the lens. When the retina of the artificial eye is so placed that parallel rays which fall on the cornea are focussed on the retina, and then, instead of parallel, divergent rays are allowed to fall on the cornea, a dispersion of the rays on the retina is obtained, when by means of a second convex lens it can be shown how the accommodation focusses them again on the retina. If it is assumed that the point where the rays diverge is the near point of the eye, the convex glass last used represents the amplitude of accommodation of the eye.

The refraction of cylindrical lenses may be shown in the same manner. To do this I have cemented on a second glass plate to be placed on the anterior surface of the model a glass which has a much greater radius of curvature in one meridian than in the other, 14 *cm* in the horizontal, 8 *cm* in the vertical meridian, such as may be found at any glazier's, as they are often used in framing oval pictures, with the space between it and the plate filled with water the same as in the other case. When this is placed before the model instead of the spherical glass, myopic and hypermetropic astigmatism can be demonstrated by moving the plate which represents the retina backward and forward. Behind the 12 D convex lens which renders parallel the rays coming from the skioptikon is placed a piece of black paper in which is a horizontal slit, interchangeable with another with a vertical slit. With these it can be shown that, for example, in an eye which is myopic in the vertical meridian, emmetropic in the horizontal, the vertical line is distinctly formed, while the horizontal appears hazy, and by then passing before the cornea of the model a cylindrical lens the horizontal line may also be made distinct and the astigmatism corrected.

3. A MECHANISM FOR THE DEMONSTRATION OF THE FIELD OF VISION.

A board 80 *cm* square has a diagram of the visual field painted upon it in black oil-colors on a white ground, without indicating the blind spot. Over this surface a slightly roughened glass plate of the same size is clamped, on which

the field for white can be very easily and quickly drawn with black crayon, and the fields for the different colors with the corresponding crayons. The blind spot is marked with black crayon in its proper place, according as the representation is one of the right or of the left eye.

Typical contractions of the field I demonstrate by means of water-color drawings on pieces of waxed paper of the same size as the model, stiffening above and below with strips of paper. One of these is laid in proper position on the model, secured by clamps, and is then ready for exhibition. At present there are thirty different visual fields thus shown in the clinic.

Some cases of contraction of the field in which it is important to present both fields at once, as well as cases of hemianopsia, are drawn on a smaller scale on white paper. Although these are also fastened to the board when exhibited, the board serves them only as a support—the model is not used.

The appliances here described have proved of service to me, and I do not begrudge the expenditure of time and labor devoted to their preparation. I would not be without them while teaching, and I hope my hearers would speak equally highly of them.

Clinical teaching accomplishes its purpose perfectly only when the students learn all worth knowing during the hours of instruction and practice, so that the study of books is secondary and its sole object is to arrange and recapitulate the knowledge obtained in the clinic, because the clinical teacher, confined to the material present, cannot arrange it in logical order, as is done in the text-books; and if any number of teachers who have the desire to model their instruction along similar lines have the attainment of this purpose lightened, and their time and labor spared, this article will have accomplished its entire purpose.

I wish to acknowledge the zealous and effective assistance which I have received from the demonstrators of the clinic, medical students Jul. Schoch and Dovolavilla, in the preparation of the photo-transparencies, glass plates, visual fields, etc.

THE QUESTION AS TO THE PRESENCE OF GANGLION CELLS IN THE IRIS.

BY DR. N. ANDOGSKY, ST. PETERSBURG.

FROM THE LABORATORY OF THE UNIVERSITY EYE CLINIC IN BERLIN.

Translated by Dr. WARD A. HOLDEN.

(With seven figures on Plates III.-IV. of vol. xxxiv., Germ. ed.)

THE nervous system of the iris has long been a favorite field for investigation, and from the numerous papers published it would appear that the richness of this sensitive part in nerve elements is truly remarkable. In taking up this subject again, I proposed to determine by means of new methods of investigation whether ganglion cells were really present in the iris or not, and thus clear up a point on which the statements in the literature are very divergent.

There are facts which seem to indicate theoretically that the iris is provided with special local nerve centres which, independently of the central nervous system, may control its musculature; in this way we could explain, for example, how atropine applied locally dilates the pupil after section of the ciliary ganglion (Hensen and Völckers) and after enucleation of the eye (de Ruyter), or how exposure to light contracts the pupil after excision of the iris (Brown-Séquard). This idea of nerve centres in the iris has not, however, been substantiated by anatomical researches, and we know, furthermore, that in this matter each writer has had an individual opinion which has in no case been so well founded as to withstand the attacks of his opponents.

METHODS OF INVESTIGATION.

For demonstrating the nervous system of the iris I chose the eyes of white rabbits, and stained the living tissues by Ehrlich's methylene-blue method and its recent modifications. Young rabbits were killed with ether, the eyes removed immediately, and with a hypodermic syringe a small quantity of a $\frac{1}{20}$ % solution of methylene blue injected into the anterior chamber. From three to five minutes afterwards the eyes were divided by an equatorial section, and the iris was carefully removed, cut into four segments, and spread out on a slide. It was then found that the nerves for the most part were stained blue, while the other tissue of the iris remained uncolored.

The effect could be intensified by injecting the stain into the vitreous fifteen minutes before the animal was killed, or by dropping a 1:3000 solution of methylene blue on the excised iris and heating the preparation for fifteen minutes. The stain was fixed by leaving the preparations from twelve to twenty hours in a saturated aqueous solution of picrate of ammonia, to which some drops of spirits of ammonia had been added; they were then cleared by being left twenty-four hours in equal parts of glycerine and water saturated with picrate of ammonia, and were finally mounted in glycerine. In order to prevent pressure of the cover upon the specimen, a cell was made of thick paper soaked in the picrate of ammonia-glycerine solution. To prevent drying the margins of the cover-glass should be covered with Damar or asphalt.

Microtome sections of the iris can be better stained by Bethé's¹ methylene-blue method, but the results are not so good as when the entire iris is stained.

THE NERVOUS NETWORK OF THE RABBIT'S IRIS.

When a flat preparation of the iris is viewed under a weak objective, the location and course of the nerves can readily be followed (see Fig. 1, Pl. III.).

The ciliary nerves after passing through the ciliary body

¹ *Archiv f. Microscop. Anat.*, xliv., p. 579.

enter the iris in distinct radial bundles (*a*). There they at once bend and run parallel to the ciliary margin, anastomosing freely. They then send a number of thick trunks (*b*) radially toward the pupillary margin, and give off a great quantity of smaller twigs. The larger of these trunks (*b*), after extending through a third or a half of the breadth of the iris, bend in arcs and unite, forming arcades from which, again, radial fibres (*c*) run, and in their turn form arcades. Besides these arcades formed of the larger twigs, there are quantities of finer arcades formed of smaller twigs, which are numerous about the pupillary margin (*d*).

All these bundles send off, one after another, finer bundles which eventually resolve themselves into single fibres which lose their medullary sheaths. Thus, under a higher power, we find that the spaces between the nerve bundles represented in Fig. 1 are in reality filled with a close network of fibres.

As respects location and function, the nerves of the iris may be classified as follows:

(*a*) Principal nerve bundles of various diameters shown at *a*, *b*, *c*, *d*, Fig. 1; they are found chiefly in the middle layers of the iris.

(*b*) Anterior to the principal bundles is a fairly dense network of fine twigs which arise from the principal bundles, anastomose with one another, and form meshes of various sizes. A network of this sort is shown in Fig. 2; *f*. is a bundle of fibres from which arises a network of twigs (*ggg*) rich in triangular and oval nuclei (*ii*); the triangular nuclei lie always at the points of division of the nerves, while the oval nuclei lie in the course of the nerves, and belong to the sheath of Schwann.

The principal bundles contain nerve elements varying in morphology, viz., thick medullated bundles with Ranvier's nodes (Fig. 4, *k*), single medullated nerve fibres with a sheath of Schwann, single non-medullated fibres with a sheath of Schwann (*l*), and, finally, fine non-medullated fibres (*m*).

As respects function, the nerve fibres may be divided into three groups:

(*c*) A dense network of fine non-medullated fibres lies at the anterior surface of the iris (Fig. 2, *h h*), which is to be considered as sensory.

(*d*) Deeper motor fibres arising from the chief network run in a radial direction to the sphincter, and there turning, run among the muscle bundles (Fig. 3).

(*e*) A system of vaso-motor nerves surrounds the vessels of the iris, being particularly thick about the larger arteries.

THE QUESTION AS TO NERVE CELLS IN THE IRIS.

A review of the literature (omitted in this translation) shows that no two writers have had the same ideas in regard to ganglion cells in the iris. In my own preparations I was not able to find any trace of ganglion cells among the fibres of the coarser bundles (as some have described them), nor at the forks of the smaller twigs (as others have described them); and I hold all the structures found at these points and thought to be ganglion cells to be merely nuclei of the nerve fibres. Nor could I find ganglion cells in the sphincter or about the blood-vessels.

In the ciliary body, on the contrary, ganglion cells were unquestionably present.

The nervous network which covers the posterior surface of the ciliary body and of the ciliary processes, and is but indistinctly seen (Fig. 1, *e e*) when a preparation of the iris and ciliary body is viewed from before, is seen quite distinctly when the preparation is viewed from behind. This network consists of nerve bundles having for the most part a radial direction. At the periphery of the preparation, corresponding to the region of the ciliary body, the radial bundles are interwoven with connecting transverse twigs and individual fibres. The nearer the pupillary region, the thinner become the nerve bundles, since they send out fibres in all directions which cover the surface of the ciliary folds, *i. e.*, the radial continuations of the ciliary processes. In some preparations I could see that the nervous network of the ciliary processes stood in connection with the entire nervous system of the iris, through the medium of thick nerve trunks (Fig. 1, *a* and *b*).

In the course of the nerve trunks of this superficial network, particularly in the ciliary region, are scattered cells which are, without question, ganglion cells. They have a fairly large nucleus ($6-7\ \mu$), and granular protoplasm. They appear either as bipolar cells $25-28\ \mu$ long and $12\ \mu$ broad (Fig. 6), or as multipolar cells $12-18\ \mu$ in diameter (Fig. 7). Besides the ganglion cells, there are single nuclei lying in the course of the nerves (Fig. 7), which cannot be confounded with the ganglion cells.

Taking into consideration the statements of other writers and my own findings, the question as to the presence of ganglion cells in the rabbit's iris may be answered as follows:

1. In the iris itself, *i. e.*, in the course of its nerves and in the region of the sphincter, ganglion cells are entirely wanting; those who have described ganglion cells as existing here have mistaken for ganglion cells either the triangular nuclei of the nerve fibres, or the branched stroma cells of the iris.

2. Ganglionic structures in the form of bipolar or multipolar nerve cells are found only in the superficial nervous network of the ciliary processes.

As to the function of these ganglion cells—while it is possible that they belong to the motor nervous system of the iris, it is more probable that they belong especially to the ciliary processes, serving as a regulating centre for the vessels and, consequently, for the secretion of the aqueous humor.

My thanks are due to Dr. Greeff for suggesting this theme, and for directing my investigations.

BIBLIOGRAPHY.

1. ARNOLD. "Ueber die Nerven und das Epithelium der Iris." *Virchow's Archiv*, Bd. xxvii.
2. FABER. *Der Bau der Iris des Menschen und Wirbelthiere*. Leipsic, 1876.
3. FORMAD. "The Distribution of Nerves in the Iris." *Amer. Jour. of the Med. Sciences*, vol. lxxv., 1878.
4. PAUSE. "Ueber die Nerven der Iris." *A. v. Graefe's Archiv*, Bd. xxiii., 3.
5. A. MEYER. "Die Nervenendigungen in der Iris." *Arch. f. mikroskop. Anatomie*, Bd. xvii., 3.
6. GEBERG. "Ueber die Nerven der Iris und des Ciliarkörpers bei Vögeln." *Internat. Monatsschrift f. Anat. und Histologie*, Bd. i.
7. GRÜNHAGEN. "Ueber das Nervensystem der Iris." *Berliner klin. Wochenschrift*, 1867.

8. GRÜNHAGEN. "Die Nerven der Ciliarfortsätze des Kaninchens." *Archiv für mikroskop. Anatomie*, Bd. xxii.
9. FÖRST. "Om Nerven i Iris." *Nord. med. Arkiv*, 1880, Bd. xii., and *Biologische Untersuchungen von Retzius*, 1881.
10. HOSCH. "Ehrlich's Methylenblaumethode und ihre Anwendung auf das Auge." *A. v. Graefe's Archiv*, Bd. xxxvii., 3.
11. RETZIUS. "Zur Kenntniss vom Bau der Iris." *Biolog. Untersuch.*, 1893.
12. AGABABOFF. "Die Innervation des Ciliarkörpers." *Anatomischer Anzeiger*, Bd. viii. (short report by Prof. Arnstein), and Russian *Dissertation*, Kasan, 1893.
13. MELKICH. "Zur Kenntniss des Ciliarkörpers und der Iris bei Vögeln." *Anatomischer Anzeiger*, Bd. x.
14. STEPANOFF. "Die Nerven der Iris." *Dissertation* (Russian), Tomsk, 1892.

Explanation of the Figures on Plates III.-IV.

FIG. 1.—The nerves of the rabbit's iris, slightly magnified : (*a*) principal bundles, (*b*) and (*c*) secondary nerve trunks, (*d*) smaller nerve trunks, (*e*) schematic representation of the nerves in the posterior surface of the preparation (nerves of the ciliary body and the peripheral portions of the ciliary folds).

FIG. 2.—Nervous network of the rabbit's iris, more highly magnified : (*f*) a secondary bundle, (*g g*) thin twigs which form a network in the middle layers of the iris, having nuclei (*i i*) at their branchings, (*h h*) thin non-medullated nerve fibres of the sensory network on the anterior surface of the iris.

FIG. 3.—The branchings of the non-medullated nerve fibres among the muscular fibres of the sphincter iridis.

FIG. 4.—A point where the secondary nerve trunks cross : (*k*) a bundle of medullated fibres with Ranvier's nodes, (*l*) bundles of fibres with nuclei of the sheath of Schwann, (*m*) single non-medullated nerve fibres.

FIG. 5.—Stroma cells of the iris stained with methylene blue.

FIGS. 6 and 7.—Bipolar and multipolar ganglion cells from the nervous network of the ciliary body and processes.

SUPPURATIVE KERATITIS.

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Translated by Dr. MATTHIAS LANCKTON FOSTER, New York.

AMONG the diseases of the cornea suppurative keratitis is the most important because of its dangerous character. This term includes the purulent ulcer, together with abscess of the cornea, as well as keratitis neuro-paralytica, keratitis ex lagophthalamo, keratomalacia, and keratitis xerotica, but cases of the latter diseases are rarely seen, and the observations in this paper regard only suppurative corneal ulcers and corneal abscesses, which are the forms usually referred to by the term suppurative keratitis.

By suppurative corneal ulcer is meant a loss of substance of the cornea associated with purulent infiltration and destruction of the surrounding tissue. Two forms are distinguished, the serpiginous and the circumscribed suppurative ulcer, the more important of which is the serpiginous, because of its greater gravity.

The serpiginous ulcer, established as a distinct form first clinically by Saemisch, and of late bacteriologically by Uthoff, Axenfeld, Bach, and Neumann, at first appears as a very shallow ulcer with a smooth or slightly infiltrated floor, which, besides, an inclination to penetrate more deeply, exhibits a pronounced tendency to spread. This tendency always follows a fixed direction, indicated by a characteristic curved, whitish or yellowish-white infiltration of the margin of the ulcer. This infiltration may also appear in the form of several little curved segments, which later blend to

include a great part of the margin of the ulcer, perhaps in isolated and protracted cases surrounding it entirely. Sometimes the purulent infiltration extends for some distance in the layers of the cornea, beyond the margin of the ulcer, so that the margin appears to be undermined. Frequently in place of the infiltrated curved margin there may at first be seen gray, hazy stripes radiating into the cornea from the ulcer. Hess considers these to be opaque folds in Descemet's membrane, though they were formerly explained as cell infiltration. The ends of these stripes may be united, as described by Saemisch, by a gray line running parallel to the border of the ulcer. In other cases the ulcer is from the first surrounded by a more diffuse haziness as it extends, sometimes to involve the entire cornea. In almost all cases an early complication is a severe iritis, indicated by marked ciliary injection, discoloration of the iris, posterior synechiæ, exudation in the pupillary area, and severe pain, which radiates to the temple and vertex. Early changes appear in the anterior chamber. Usually during the first few days a deposit of pus corpuscles, forming a cloudy opacity, occurs on the posterior surface of the cornea at the point which corresponds to the position of the ulcer, and later there is an accumulation of pus at the bottom of the anterior chamber—a hypopyon. Sometimes a yellowish line of pus extends on the posterior surface of the cornea from the ulcer down to the hypopyon, and on this account its origin was formerly attributed to direct transmission of pus corpuscles through the cornea from the ulcer, but it must be considered as settled by the investigations of Leber, Stromeyer, Hoffmann, and Uthoff that the origin of the hypopyon is from the vessels of the iris, the neighborhood of the pectinate ligament, and the canal of Schlemm. Descemet's membrane was always found intact in non-perforated ulcers, various pigment granules were found in the hypopyon, and the bacteria, so richly present in the progressive margins of the ulcer, were absent in the non-progressive floor.

The size and consistence of a hypopyon are variable. At first it appears as a small yellow crescent at the bottom of the anterior chamber, while in the later stages of the disease it

often becomes so large as to fill the greater part of the anterior chamber. In the latter cases it is difficult to determine how far the purulent infiltration extends over the cornea, because it cannot be distinguished from the hypopyon. At first it is very fluid, and presents a horizontal upper border which moves with each change in the position of the head, but later it may become thick through admixture of fibrin, so as to appear as a globulated, yellowish mass. This condition is observed, according to Saemisch, in about 70 per cent. of all cases. The pains and other annoying symptoms due to the iritis are of very variable character; in some cases the pain is so severe that the patients cannot rest at night, in others the malady is so mild that the patients are first impelled to consult a physician on account of the disturbance in vision after the ulcer has already reached a large size. When an ulcer spreads not only superficially, but also into the deeper tissue, the floor becomes whitish or yellowish-white, infiltrated, and thinner. Sometimes an ulcer appears more superficial than it really is, when the proportionately less cloudy floor is pushed forward under pressure of the aqueous. Unless this process is in some way checked it will often result in purulent infiltration and destruction of a great part of the cornea, perforation, prolapse of the iris, and finally total or adherent leucoma. In large ulcers with thin floors a staphyloma is frequently formed, and in rare cases panophthalmitis results after perforation. As might be expected from its frequently traumatic origin a serpiginous ulcer is almost always to be found in the interpalpebral space, in the central and lower parts of the cornea. After it has run its course, or has been checked at an early period, there always remains a macula or leucoma which, because of its usually central position, materially interferes with vision.

In contradistinction from the serpiginous ulcer we will designate all other purulent forms as circumscribed suppurative corneal ulcers. The nomenclature of these varies in the text-books. Schmidt-Rimpler describes them not as ulcers, but as infiltrations, Saemisch as inflammatory deep corneal ulcers, while Uthoff and Axenfeld call them "atypical

hypopyon-keratitis," a name also proposed by Vossius. Others, on the contrary, restrict the name hypopyon-keratitis to the serpiginous ulcer. In the classification of the forms of suppurative keratitis, the designation hypopyon-keratitis may with propriety be excluded, for, as F. W. Hoffmann says, hypopyon indicates only one symptom, dependent on the intensity and duration of the disease, which may appear in the course of any infectious keratitis and does not belong exclusively to any one form of ulcer. As a matter of fact, hypopyon may be absent in all forms of suppurative keratitis. These circumscribed suppurative ulcers, although they may spread superficially, show no pronounced tendency to do so, but rather to penetrate more deeply, and they present irregularly infiltrated floors and margins, with striated or diffuse opacity of the cornea in the neighborhood. Iritis and hypopyon are present as in serpiginous ulcers, but are usually of less intensity. On account of the tendency to penetrate deeply in this form of ulcer, perforation occurs with comparative ease, usually causing an arrest of and recovery from the ulceration, often with the formation of a leucoma adherens. These ulcers seldom attain a great size, and, aside from the danger of prolapse of the iris and its attendant consequences, are much less serious than the serpiginous variety. They rarely occasion complete loss of the eye, several are sometimes present in the same eye, and they are not confined as to situation to the interpalpebral space.

Under abscess I include only the circumscribed masses of infiltration in the cornea, beneath an intact outer surface, which, by their yellow color, or by the presence of a hypopyon, prove themselves to be suppurative. They are usually round, single or multiple, of a grayish or yellowish-gray color. Sometimes primarily small and multiple abscesses merge in the course of the disease to form one large abscess. Usually they attain no great size, except in such virulent varieties as that observed by Schweigger during an epidemic of smallpox. In its later stage the abscess may become an ulcer through destruction of the superficial layers of the cornea, but this is by no means the invariable course, and it may retrograde without damage to these superficial layers,

leaving behind a circumscribed interstitial opacity. These abscesses are very rare.

The following remarks are based on the cases of suppurative keratitis, with the above-mentioned limitation in meaning, which were treated between April, 1893, and September, 1898, in the *Königlichen Universitäts-Augenklinik* in Berlin, together with those seen at the *Poliklinik* during the summer of 1898. Among the 4877 patients who received hospital treatment during this time, 237 had suppurative keratitis—4.8 %; 205 of these were cases of serpiginous ulcer, 27 of circumscribed suppurative ulcer, and 5 of abscess. To these we add 24 cases seen at the *Poliklinik*, of which 16 were serpiginous ulcers, 8 circumscribed suppurative ulcers, and 1 an abscess.

It is well known that in a great many cases suppurative keratitis, particularly serpiginous ulcer, is caused by a slight superficial injury of the cornea. Country people at harvest time present with comparative frequency serpiginous ulcers which have resulted from slight injuries to the cornea from beards of rye, straws, etc.—the keratitis of reapers. Saemisch in his first paper on this disease found an antecedent injury in 40 % of his cases, but later writers have found the percentage much greater. Hillemanns found an antecedent traumatism in 43 out of 57 cases, Schmitz in 70.6 % of males and 47 % of females, Wehrle in 70 %, and Vossius in 63.16 %. Of the 221 cases of serpiginous ulcer here presented, 119, 53.8 %, were known to be of traumatic origin. Probably this percentage would be higher were it not that many patients pay little heed to the slight injuries of the eye to which they are accustomed to be exposed in their daily work, and often have forgotten them on account of their insignificance. Schmitz and Vossius have expressed the opinion that the serpiginous ulcer is always occasioned by an injury.

In our cases the traumatism was inflicted:

- 38 times by beards of rye, straws, haystacks ;
- 19 “ “ twigs ;
- 15 “ “ bits of stone ;
- 11 “ “ sand or dust ;
- 6 “ “ bits of iron or other metal ;

6 times by splinters of wood ;

4 “ “ lac, pitch, or tar ;

once each by finger-nail, machine-needle, horse's tail, flies, friction of eyelashes, and sulphuric acid. Eleven patients could not tell the nature of the offending body. In this compilation injuries received in agricultural work are the most numerous. Unfortunately, these patients very often apply for treatment too late, after a considerable portion of the cornea has been destroyed. This is due in part to social conditions, in part to the indifference of the patient, and also, as Vossius claims, in many cases to the red-tape of sick-benefit societies, which prevents for several days the entrance of the patient into the hospital. Meantime the ulcer may have attained such extent that there is little vision left to be saved.

As the serpiginous ulcer is usually occasioned by traumatism, it should be expected to occur more often in men than in women. Of our 221 cases, 137 were in men, 84 in women. Of Schmitz's cases, 178 were in men, 83 in women, and Vossius found it in 258 men and 87 women. The serpiginous ulcer occurs most often in the poorer classes of working people, because they are more liable to injuries of the eye, and because diseases of the tear passages, conjunctiva, and lids, which are important in the etiology of this form of ulcer, are most frequently met with in this class of people.

Blennorrhœa of the lachrymal sac was early recognized as a frequent and dangerous complication of the serpiginous ulcer. Saemisch states in his *Handbuch* that he found dacryocystitis present in 32 % of his cases, while Schmidt-Rimpler found it in 54 %.

The observations of Vossius and of Schmitz show that of 345 cases, 186, 53.9 %, presented serious complications, 155 on the part of the lachrymal passages, 31 on the part of the conjunctiva and lids. Schmitz found dacryocystitis almost twice as frequently in women as in men, in the former in 53 %, in the latter in 27.7 %. Of our own cases, 89, 42.2 %, had dacryocystitis, and they confirm the observation of Schmitz with regard to its relatively greater frequency in women, as it occurred in 57.2 % of the women, but in only 29.6 % of the men.

Information as to the connection between purulent keratitis and dacryocystitis has been obtained by means of experimental inoculations of the cornea by Eberth, Leber, and Stromeyer. This is certain, that purulent keratitis may be an inflammation which results from septic infection of a corneal wound and that thus the purulent secretion from the lachrymal sac plays an important part in its causation. The best evidence of this is furnished by direct inoculation of the cornea with the secretion of the lachrymal sac, as done by Schmidt-Rimpler. Lately the true excitant of infection in cases of serpiginous ulcer has been bacteriologically demonstrated. This was first declared to be the pneumococcus by Gasparini and Basso, and later Uhthoff and Axenfeld were able to obtain from the margins of almost all cases of serpiginous ulcer pure cultures of the pneumococcus, so that there is little doubt as to the specific excitant of this form of ulcer. In only a very slight number of cases of atypical suppurative keratitis could pure cultures of pneumococci be obtained, the cultures usually showing a mixture of other micro-organisms, staphylo- or streptococci, and bacilli, or a mixture of these with pneumococci. These micro-organisms are not usually introduced by the injury into the corneal wound, except in those rare cases caused by the *aspergillus fumigatus*, but are brought into it by a secretion in the conjunctival sac or by improper behavior on the part of the patient. According to the above-mentioned authors pneumococci are often found in secretions from the lachrymal sac, in the saliva and nasal discharges, occasionally in certain forms of conjunctivitis, and sometimes on the normal conjunctiva. Staphylococci and streptococci are found in the normal as well as in the pathological conjunctival sac. The pneumococci can be found only in the spreading margins of the ulcers, neither within the eye nor in the hypopyon. This freedom of the hypopyon from bacteria explains the fact that it is usually well tolerated by the eye and that it is often quickly absorbed, leaving no injury behind. Through their metabolic products, toxins, the cocci excite the purulent irido-cyclitis which occasions great pain and the formation of the hypopyon. It has been mentioned that

hypopyon is not present in all cases. We found among our 221 cases, 198 with, 23 without, hypopyon, so it was absent in 10.4 %.

It should also be mentioned that there is a decidedly greater disposition toward serpiginous ulcers in elderly than in young persons. Most of the cases were observed in patients between 40 and 70 years of age. A division of our cases according to age gives this result: Patients of 10 years of age and under, 1; between 10 and 20 years, 6; between 20 and 30, 13; between 30 and 40, 28; between 40 and 50, 55; between 50 and 60, 65; between 60 and 70, 37; of 70 and upwards, 16. One explanation of its rare occurrence in children is that the cornea is then more resistant to infection, another, that dangerous complications on the part of the lachrymal passages are much rarer in childhood than in adult life.

The treatment of the serpiginous ulcer has by degrees become very successful, though there are still cases in which the destruction of the cornea progresses steadily in spite of any treatment whatever. Roser, who, fifty years ago, first described purulent keratitis under the name of hypopyon-keratitis, had to admit the almost complete inability of treatment to check its extension. A great advance was made by A. von Graefe, who recommended the use of warm instead of cold applications, atropine, and a pressure bandage, a treatment still employed in the early stage of a serpiginous ulcer, and denominated medicinal. He also recommended to dilate the lachrymal sac, to express its contents frequently, to touch the floor of the ulcer with a 1 % solution of silver nitrate, and he introduced the operation of paracentesis of the anterior chamber. An attempt to control the ulcer by means of an iridectomy he abandoned as useless. Some years later he proposed the use of chlorine water, which is even yet used in this hospital as a cleansing agent in purulent keratitis. In 1870 Saemisch brought forward, simultaneously with his clinical description, incision across the ulcer, keratotomy, to check its progress. He halved the entire floor, in the direction of progress as shown by the margins, with a small knife entered and brought out in

healthy corneal tissue, the edge directed upward, the wound to be opened daily until after the infiltration has been destroyed. This operation was received with great warmth at the time and is often performed even now with good results, although many disadvantages are connected with it. After it was recognized that purulent keratitis depended on septic infection, a great number of antiseptics, corresponding to the progress of antiseptics, were tried, but many were not tolerated by the eye. Schweigger is right when he says that "the greatest triumph of antiseptics is in the prevention of traumatic diseases; if a septic infection has once taken place, the bacilli and cocci are able to offer greater resistance to antiseptics than the delicate tissues of the eye, in which they have nestled." Of all the agents which have been tried, the only ones worthy of retention are chlorine water, iodoform, and solutions of corrosive sublimate and of boric acid.

The use of antiseptics developed a new operative treatment, cauterization. Martinache used the actual cautery, Sattler and Nieden recommended a suitable form of the galvano-cautery, and Eversbusch added the thermo-cautery for this purpose. Some form of the galvano-cautery, by means of which the ulcer is touched with a fine, hot platinum loop, is now generally used in this hospital as well as elsewhere. As a result of the good results which Nieden obtained with the galvano-cautery in suppurative keratitis, this treatment has become acknowledged by most ophthalmologists as the most efficacious and the least dangerous.

In 1884, Schiess recommended the linear cauterization with a fine caustic pencil of the lower conjunctival fold when greatly swollen in cases of serpiginous ulcer. Although, according to Fisch and Wehrle, this treatment affords good results, it has not been much employed. The subconjunctival injections of corrosive sublimate, once extolled, may be laid aside as useless and sometimes dangerous in suppurative keratitis. Subconjunctival saline injections, as recommended by Mellinger, have also thus far proved of little use.

The treatment usually instituted in this hospital for a serpiginous ulcer is as follows: The eye is first thoroughly

cleansed with a 1:5000 solution of corrosive sublimate. If the ulcer has not yet attained any considerable size, the further treatment is that termed medicinal, the instillation of atropine and of chlorine water, bathing with warm solutions of corrosive sublimate or of boric acid, and the application of a moist dressing. Atropine is used very freely at first, sometimes conjointly with scopolamine, to obtain the greatest mydriasis possible. Chlorine water is used almost exclusively in this hospital as an antiseptic collyrium, not only in serpiginous ulcers, but also in all forms of suppurative keratitis. The solution used should be perfectly fresh, because after long standing it loses its efficiency and becomes an irritant. It is usually instilled simultaneously with atropine, sometimes hourly. In large ulcers with much secretion iodoform is also used, but this is not equally tolerated by all patients. A pledget of cotton wet with a 1:5000 solution of corrosive sublimate is laid on the eye, covered with a piece of rubber tissue, over this a layer of dry cotton, and then a bandage is applied. When corrosive sublimate is not well borne, boric acid may be substituted.

When the discharge is considerable, the dressing is renewed in the evening after washing out the conjunctival sac. Experience has proven that a large number of serpiginous ulcers, taken in the beginning of the inflammation, may be checked and cured under this quiet, conservative treatment, and that it is not necessary and should not be recommended, as is done by some, to cauterize every serpiginous ulcer. Statistics show that about half of all cases recover under this medicinal treatment.

It is very important to remove immediately any disease of the lachrymal sac if present. In this hospital the most radical measures are adopted; if a serpiginous ulcer is complicated with dacryocystitis, the lachrymal sac is opened externally, tamponed daily, or, when there is much discharge, twice a day, with iodoform gauze, and sometimes extirpated. The suppuration is but insufficiently removed by probing and washing out the sac, and this leaves the ulcer consequently exposed to the constant danger of an inundation of pus. Total extirpation of the sac is a most rational pro-

cedure: it removes forever the danger, which is of special importance in those cases which recover with a leucoma adherens, and deserves to be performed much more often than it has hitherto been. The operation is usually easily done, though sometimes it is prolonged and difficult on account of free hemorrhage. The wound heals in a few days, the linear scar is after a short time not noticeable, and the slight epiphora, which sometimes remains, does not trouble the patient. A very good technique is that proposed by Kuhnt in 1888. The nail of the left thumb is placed on the anterior lachrymal crest, and an incision 2.5 *cm* long, made down to the bone. The incision should begin 4 *mm* above the internal palpebral ligament, and extend to 5 *mm* above the commencement of the bony naso-lachrymal canal. In this way one cuts down with certainty upon the lachrymal sac, and does not so easily cut into the orbital fat. The sac is then dissected out entire, beginning at the inner wall, and the wound is closed with sutures.

If while under the medicinal treatment the ulcer spreads, then cauterization, particularly of the infiltrated part, is indicated, and in case a large hypopyon is present, either perforation of the floor of the ulcer with the galvano-cautery or, if the hypopyon is very large and apparently viscid, paracentesis at the sclero-corneal margin. It is always important to open the anterior chamber, whenever a considerably large hypopyon is present, in order to let out the pus, together with the aqueous humor, which is full of toxins. The perforation should always be very small, punctiform, and, if possible, in the pupillary area. A small hypopyon may be allowed to become absorbed spontaneously. When the patient first comes under observation, cauterization is indicated when the ulcer has already lasted some time, is of considerable size, and shows a decidedly progressive character by the marked infiltration of its margins. On the other hand, in such ulcers as have spread over the entire cornea, operative intervention is hopeless, and they should receive only the medicinal treatment, except that a paracentesis may be made to evacuate a large hypopyon when present. Cauterization is well borne by the eye, and the annoyance it occasions

soon passes away. If after the first cauterization the ulcer continues to spread, the operation should be repeated. When there is a large hypopyon, it is advisable to delineate the infiltrated portion of the cornea by means of fluorescein, which, as described by Nieden, in about a minute after instillation, and after washing out the conjunctival sac, renders the affected area plainly visible by changing its color to green or greenish yellow. When perforation of the ulcer is threatened, a pressure bandage should be applied, and the patient placed in bed, in order to prevent, or at least delay, this accident, and to avert a large prolapse of the iris. If the ulcer is in the reparative stage, and the condition of irritation almost gone, an ointment to aid in clearing up the cicatrix can be ordered. After complete recovery, an iridectomy for visual purposes may be performed, but a noteworthy improvement is seldom obtained thereby.

If we turn now to the treatment of our 221 cases of ser-piginous ulcer, we find that medicinal treatment alone was used in 94, operative in addition in 127. Of the 94 cases, 82 recovered under this conservative treatment, leaving behind a macula or leucoma. In 10 cases this treatment was instituted because when first seen the cornea was quite, or nearly quite, infiltrated, in some perforated. In 5 of these cases exenteration was performed on account of panophthalmitis shortly afterward, 3 cases resulted in a total or nearly total leucoma, 1 in staphyloma, 1 in phthisis. Of the remaining two cases, one was prematurely discharged, the other refused operation,—in this the result was total staphyloma.

Cauterization was employed in 102 cases, in 73 once, in 29 more than once, usually two or three times. Simultaneously with the cauterization perforation on the floor of the ulcer with the galvano-cautery was performed 19 times, paracentesis 8 times. In 2 cases after previous cauterization, as the hypopyon showed no tendency toward absorption, an additional paracentesis was performed, in one case after a previous puncture, as the ulcer continued to spread after it had been cauterized. In 92 of these 102 cases the process was brought to an end by the cauterization, in 8 the ulcer continued to spread in spite of the treatment, and 2 patients

left prematurely. This intervention was therefore successful in 92 %, unsuccessful in 8 %. The results in the 8 unsuccessful cases were : in 4 total or nearly total leucoma, in 3 staphyloma, in 1 panophthalmitis.

Keratotomy was the sole treatment in only 6 cases. In all, the ulcers were cured, in 4 with the formation of a leucoma adherens. In one of these cases, in which a prolapse of the iris occurred at one end of the incision, a fresh inflammation broke out about four weeks after the healing of the ulcer, which resulted in panophthalmitis.

Cauterization and keratotomy (Saemisch's incision) were done in 9 cases. In 3, after a fruitless keratotomy, cauterization effected a cure, and, on the other hand, twice after cauterization had failed keratotomy proved effective, each time with the production of an anterior synechia. In 4 cases in which the ulcers were very large and widespread, the use of both of these means failed to check the extension of the suppurative process; in 2 cases the result was total leucoma, in one staphyloma, and in one phthisis.

Paracentesis was performed in 8 cases in which a large and apparently firm hypopyon was present. In 5 the ulcer healed after this treatment alone; in 2, where the ulcer had involved the greatest part of the cornea, so that any other treatment seemed hopeless, it failed; 1 case left prematurely.

In a case of serpiginous ulcer which had developed in a glaucomatous eye, iridectomy induced healing of the ulcer.

Subconjunctival injections of corrosive sublimate were tried several times, but with no good results, so that other methods had to be employed. In one case a very severe chemosis of the conjunctiva, which occasioned a new marginal ulcer, followed the injection.

No conclusion as to the value of a method of treatment can be derived from the degree of vision saved in these cases, as that depends much on the position of the ulcer. The essential question to be answered is, What method is the fittest and the surest to check the spreading of the ulcer on the cornea? Our experience in this hospital enables us to advocate as such a method cauterization of the ulcer, with or

without galvano-puncture of its floor or paracentesis. Galvano-puncture is sufficient for the evacuation of a medium-sized fluid hypopyon, while paracentesis is to be preferred when the hypopyon is very large and apparently viscid. Paracentesis may also be preferred when a deep ulcer with a thin floor is associated with a small pupil, as it may prevent the occurrence of a spontaneous perforation, which heals with difficulty, and the formation of an anterior synechia. In the 19 cases treated by perforation of the floor of the ulcer, leucoma adherens was observed 5 times. Schmitz in his article on the treatment of serpiginous ulcer, declares cauterization to be inferior to keratotomy for the typical case, because the severer forms, not amenable to the medicinal treatment, are not suitable for cauterization, but this opinion must certainly be based on an insufficient experience with the method. Cauterization produces at least as good results as, if not better than, keratotomy in all forms, even the worst, of serpiginous ulcer, without the disadvantage of causing anterior synechiæ. Nieden obtained out of 100 cauterized cases of destructive keratitis, most of which were serpiginous ulcers, 88% recovery, 12% leucomata, no case of phthisis. He obtained similarly good results in a second hundred of cauterized cases, 85 cases of serpiginous ulcer, of which 75 recovered with maculæ, 10 with leucomata. Such remarkably good results can be explained only by the absence among Nieden's cases of such bad ones as may frequently be seen in this hospital. Schultz reports on 109 cases of serpiginous ulcer treated at Jena: 45 were cauterized, all with success; in 31 after a single application, in 14 after more than one. Vossius reports 83 cases of cauterization, combined 36 times with perforation. In 18 of these cases the final vision was unknown, in one nil, in 6 perception of light, and in the rest a measurable quantity. In 87 of the 119 cases, cauterization was performed only once, in 32 cases it was repeated.

As regards keratotomy, this method is objectionable in that it is apt to cause anterior synechiæ; the occurrence is to be avoided if possible, as they are of themselves a source of danger to the eye. Of Hillemann's 25 cases 23, 99%, recov-

ered, but 15, 60 %, with anterior synechiæ. Of Schmitz's 138 cases, 126, 91 %, were successful, but of these 91, or about 75 %, had leucoma adherens. Vossius reports 53 cases treated with combined cauterization and keratotomy, and 22 with keratotomy alone, and in 35 out of these 75 cases a resultant leucoma adherens. This danger of the formation of anterior synechiæ is present not only in large and deep ulcers, but in all in which the incision extends beyond the usually narrow pupil, which it is difficult to dilate with atropine. Beyond question the frequent reopening of the wound also favors this accident. In this hospital the operation is seldom performed, as compared with cauterization, and then only in cases in which the ulcer is associated with a large and apparently firm hypopyon. Usually in such cases cauterization is also used. Keratotomy may be preferable when an ulcer in the lowest part of the cornea has an infiltrated and ruinous floor, because a smooth cut directly through the infiltrated tissue is better than an oblique one through the same. It may also be better when the ulcer is very extensive and with a very thin floor, because a large anterior synechia is preferable to a staphyloma, the probable result in such cases. Keratotomy in spite of its undoubted effectiveness is then not as universally applicable as cauterization, but is restricted to a certain class of cases.

If we turn now to the second class, the circumscribed suppurative ulcers, we find that 27 cases were observed in the hospital during the time stated, and 8 at the poliklinik. This comparatively small number is due to the fact that this form of ulcer requires hospital treatment less often than the serpiginous variety. Of these 35 cases, 31 were in children under eleven years of age, 4 in adults. In 25 of the children a hypopyon was present, but smaller than is usual in serpiginous ulcer; in 6 it was absent, but that the ulcers were suppurative was evident from their yellowish appearance. In 22 cases the ulcer originated in a scrofulous keratitis, in 3 from purulent conjunctivitis. In one case an old leucoma adherens set up a severe purulent inflammation with hypopyon. In 4 cases no special cause could be ascertained. In only 1 case had there been an injury. Of the 4 cases in

adults, 2 resulted from protracted purulent conjunctivitis, 1 originated spontaneously, and 1 from an indefinite injury. The ulcers were without hypopyon, exhibited no special tendency to spread, and their floors and borders were irregularly infiltrated. In none of the 33 cases was dacryocystitis present.

The treatment in 23 of the cases consisted of atropine, chlorine water, warm applications, and perhaps a moist dressing. The dressing was naturally contraindicated in all cases where there was much discharge from the conjunctiva, and in such cases astringents and cold applications were used. Spontaneous perforation occurred in 4 cases, and resulted in 3 in the formation of an anterior synechia. After perforation recovery was rapid. Cauterization was employed in 10 cases, combined twice with puncture, once with perforation, in each case with good result. No loss of the eye occurred in any of the 38 cases. As compared with the serpiginous ulcer the circumscribed suppurative ulcer is innocuous. It is usually amenable to medicinal treatment, and only on account of a very protracted course, superficial extension, or a moderately large hypopyon is cauterization, perhaps with paracentesis or galvano-puncture, needed. It is quite proper in an ulcer which threatens to perforate, to puncture the floor of the ulcer with the galvano-cautery, or with a needle, in order to prevent a sudden irruption with a greater prolapse of iris. The re-formation of the anterior chamber will then be hastened by the application of a pressure bandage. When the ulcer showed itself to be recovering, the use of ointments was begun, especially when it was of scrofulous origin. A general tonic treatment may hasten the recovery of these cases, which often run a very prolonged course.

During the 5½ years, cases of true abscess of the cornea seldom came under observation,—only 6 in all. In 2, several little collections were present, which later united to form one large abscess. In 4 of the 6 the abscess was accompanied by hypopyon, in all by a very painful iritis. Five occurred in men between the ages of forty and forty-five, 1 in a child who had frequently suffered from a recurrent scrofulous keratitis. No cause could be assigned for the

occurrence in any of the adults. The treatment instituted was atropine, warm applications, and a moist dressing, to which was added diaphoresis for the purpose of hastening the process of absorption. In one case the morbid process was checked, leaving behind an interstitial cloudiness in place of the abscess. In another case, in which several deposits had united in one large abscess, recovery with a macula was obtained by cauterization. In a third case many little abscesses were repeatedly cauterized and punctured in vain, and finally the patient voluntarily withdrew. In 2 cases recovery was obtained after keratotomy, 1 with a leucoma adherens. In one of these cases paracentesis with evacuation of the hypopyon was insufficient to bring about the healing of the abscess. The fifth case, in the child, recovered under medicinal treatment, leaving an interstitial cloudiness.

In this form of suppurative keratitis also, non-operative treatment should be first tried, and operative procedures instituted if the abscess increases in size or is accompanied by a large hypopyon. Then is indicated cauterization of the entire abscess, together with paracentesis to evacuate the hypopyon, especially in multiple small abscesses, while keratotomy should be reserved for those cases in which there is a large abscess reaching far into the tissue, cauterization of which in its entirety would create an ulcer with a very thin floor.

ON THE CHANGES IN THE EYE AFTER LIGATION
OF THE GALL BLADDER (AN EXPERIMENTAL
CONTRIBUTION TO THE KNOWLEDGE OF OPH-
THALMIA HEPATICA).¹

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(*With 14 figures on Plates XI.-XII. of vol. xxxiv., German edition.*)

IT has long been recognized that in general diseases various pathological changes occur in the eye, affecting chiefly its vascular and nervous apparatus. The effect of the general disease manifests itself in inflammatory or degenerative processes in the tissues of the eye when the toxic agent in the blood exerts a distinct influence on the tissues. At times, however, degenerative processes in the eye stand in no direct connection with a general disease, but develop gradually as the result of the increasing general emaciation. The most probable cause of all the pathological changes occurring in the eye in general diseases and intoxications is an abnormal chemical composition of the blood, consisting in changed quantitative relations in its component elements or in the addition of various chemical organic poisons. After what has been said, it seems strange that so few observations and scientific investigations have been made regarding the ocular changes accompanying diseases of the liver—an organ whose disorders give rise to various alterations in the chemical composition of the blood. The little clinical attention paid to the matter is perhaps

¹ From the laboratory of the Berlin University eye clinic.

due to the fact that the ocular changes which are observed in diseases of the liver are rarely of high degree, and pass unnoticed among the more violent symptoms on the part of other organs, so that they are little regarded either by physician or patient. This paucity of clinical observation is, furthermore, the reason that experimental studies of the matter have rarely been undertaken, the papers by Althoff-Müller and Zitten being the only ones on the subject.

The present paper contains a description of the pathological changes found in the eyes of four dogs which died following ligation of the common bile duct. After the operation some of the dogs lived as long as one hundred days. For the eyes I am indebted to Dr. Werbitzski, and an abstract of the changes which he found in the other organs appears later in this paper.

[A résumé of the literature, occupying eleven pages, is here omitted.—*Trans.*]

The results of previous observations in ocular affections in connection with diseases of the liver may be tabulated as follows:

SUBJECTIVE SYMPTOMS.

1. Amblyopia and amaurosis (Himly, Ruete, Bischoff, Landsberg, Baas).
2. Hemeralopia (Kochling, Ruete, Bamberger, Fumagalli, Strauss, Cornillon, Parinaud, Gorecky, Litten, Maully, Weiss, Leber, Baas, Hori).
3. Xanthopsia (Hofmann, Frank, Stokes, Bamberger, Strauss, etc.).
4. Erythropsia (Junge).
5. Defective perception of color (Parinaud, Weiss, Hori).
6. Scotomata (Parinaud).
7. Concentric contraction of the visual field (Weiss, Hori).

OBJECTIVE SYMPTOMS.

1. Hemorrhages in the retina (Junge, Stricker, Buchwald, Zitten).
2. Œdema of the retina (Fumagalli, Poncet).
3. Inflammatory and degenerative processes in the retina

and atrophy of the retina (Junge, Müller and Althoff, Weiss, Baas, Hori, Pasadsky).

4. Pigmentary inflammation of the retina (Landolt, Litten, Hori).

5. Neuro-retinitis (Weiss, Baas, Hori).

6. Inflammatory and degenerative processes in the uveal tract (Weiss, Baas, Hori).

7. Dryness of the mucosa of the eye (Weiss, Leber, Baas).

All the clinical symptoms have been explained fully by the microscopic examinations.

MICROSCOPIC CHANGES.

1. In the optic nerve: œdema, infiltration with leucocytes, and atrophy of the peripheric fibres.

2. In the retina: œdema, inflammatory processes in the walls of the vessels, proliferation of the nuclear layers, alterations in the pigment epithelium, formation of new connective tissue, different degenerations of the nerve cells, and sometimes complete atrophy of the entire retina.

3. In the choroid: inflammatory infiltration, thickening of the walls of the vessels, and new formation of connective tissue, at times leading to complete disappearance of the choroidal tissues.

The pathological changes that I found in the dogs' eyes were for the most part the same as those that have just been mentioned, but before proceeding to the detailed description, I wish to present the conclusions at which Dr. Werbitzski arrived after examining the internal organs of the dogs that died after ligation of the bile duct.

1. Animals may live as long as one hundred days after ligation of the bile duct.

2. In the course of this time they become anæmic, but this is due rather to a mucoid degeneration of the bone marrow than to the alterations in the blood due to elements of the bile.

3. In the liver cirrhotic changes occur which lead to an atropic, granular liver, with corresponding clinical symptoms.

4. In the kidneys there are parenchymatous changes, the glomeruli being affected at the same time with the epithelium.

5. The intestines exhibit a catarrhal affection with a tendency to hemorrhage.

6. The icterus, which does not always appear, decreases in time, perhaps in consequence of the lessened bile-producing power of the liver.

7. The pulse of the animals is accelerated while the respiration remains unchanged.

8. The weight of the animal steadily decreases, the nutrition is disturbed, and the temperature falls.

It appears likely that all these changes, and the unavoidable death of the animal, are due to altered metabolism, and the condition of the urine also indicates this.

The dogs whose eyes I examined lived two or three months after the ligation.

First Dog.—The optic nerve is œdematous and its bundles are separated in many places by empty spaces. The connective tissue throughout the nerve is moderately infiltrated with uninuclear leucocytes. The disc is swollen and markedly infiltrated with leucocytes, but this infiltration diminishes in the nerve-fibre layer of the retina, and farther back in the nerve. The vessels of the optic nerve are filled with blood. Two vessels, however, are partly filled with a thick granular mass attached to the vessel wall, staining blue with hematoxylin and rose with Van Gieson's stain. The vessels of the retina are filled with blood, and the vessels of the choroid are dilated. The nerve-fibre layer of the retina contains a transuded liquid which has forced the fibres apart. This œdema is more marked in the nerve head, and gradually diminishes toward the ciliary body. There is also an infiltration of this layer with leucocytes, some of which have undergone fatty degeneration. The ganglion-cell layer is œdematous, and many of the cells have undergone various sorts of degeneration. The outer layers of the retina are œdematous, and the nuclei in the two nuclear layers are irregularly increased in number. Furthermore, nuclei of the outer layer have pushed through the membrana limitans externa, and lie among the rods and cones. The latter are swollen and partly broken down into myelin drops. In places a fibrinous exudation lies between the retina and choroid.

Many of the choroidal vessels are distended, and a fibrinous exudation is seen about the vessels and through the choroid generally.

The vitreous in its peripheric portion contains a fibrinous exudation.

To sum up, there were found inflammatory changes as follows: (1) œdema of the optic nerve and retina; (2) distension of the vessels of the retina and choroid; (3) an infiltration of the optic nerve and the nerve-fibre and ganglion-cell layers of the retina with leucocytes; (4) a fibrinous exudation between choroid and retina, and in the choroid itself; (5) beginning thrombosis of individual retinal vessels; (6) increased thickness of the nuclear layers of the retina, and (7) a fibrinous exudation in the vitreous. Besides these inflammatory changes, degenerative changes were found in the ganglion cells, rods and cones, and pigment epithelium. The case then was one of beginning inflammation of the optic nerve, with an advanced exudative inflammation of the retina and choroid.

Second Dog.—The optic disc is densely infiltrated with leucocytes, but the infiltration is less marked farther back in the nerve and in the nerve-fibre layer of the retina. The optic nerve and inner layers of the retina are œdematous. The retinal and choroidal vessels are distended with blood, the endothelium is swollen, and in the retinal vessels there are evidences of perivasculitis. Many of the retinal ganglion cells are degenerated. The nuclei of the nuclear layers are increased in number. The rods and cones are partly broken down. The pigment has, to a considerable extent, wandered out of the pigment epithelium. There is a fibrinous exudation in the periphery of the anterior chamber.

The changes found in this case were similar in nature to the changes found in the first dog. There was here a well marked neuritis and perineuritis, accompanied by a less marked inflammation of the choroid and retina.

Third dog.—In the optic nerve there is a slight infiltration with round cells continuing into the inner layers of the retina and a short distance back in the nerve. The nerve-fibre and ganglion-cell layers of the retina are œdematous and the vessels are congested. The ganglion cells are degenerated in various ways, the rods and cones are broken down, and the pigment has wandered out of the pigment epithelium.

The changes here are those characterizing the beginning of an inflammatory process in the retina.

Fourth dog.—The optic disc is infiltrated and œdematous, as are also the nerve-fibre and ganglion-cell layers of the retina. The ganglion cells are degenerated in various ways. The cells of the nuclear layers are increased. Müller's fibres are thickened. The retinal and choroidal vessels are distended with blood. In the choroid and between it and the retina and in the vitreous are fibrinous exudations. The usual degenerative changes in the rods and cones and pigment epithelium were found.

We had here to do, therefore, with a well marked exudative inflammation of the retina and choroid and a beginning inflammation of the optic nerve.

From these findings we may draw the following conclusions:

1. After ligation of the common bile duct the coats of the eye undergo very pronounced changes of inflammatory and degenerative characters.

2. The changes are found in the stroma of the connective tissue, in the vascular system, and in the nervous elements.

3. The changes in the connective tissue consist in the proliferation of the nuclei.

4. The alterations in the vascular system comprise distension of the vessels, swelling of the endothelium, perivasculitis, enlargement of the spaces about the vessels, hemorrhages, and exudations.

5. The affections of the nervous system consist in various degrees of degeneration of the protoplasm of the ganglion cells, alterations in the nuclei, and enlargement of the spaces about the cells.

All these changes point to a distinct cause for their origin and development and one cannot consider them to be simply the expression of lowered general nutrition.

In conclusion, I wish to express my thanks to Dr. Greeff, who has kindly examined all of my preparations.

Explanation of the Figures on Plates XI. and XII.

FIG. 1.—A ganglion cell lying in a cavity produced by œdema of the stroma of the retina.

FIG. 2.—Œdematous ganglion cell surrounded by large cavities.

FIG. 3.—Œdematous ganglion cell surrounded by leucocytes.

FIG. 4.—Œdematous ganglion cell containing a leucocyte (?).

FIG. 5.—Peripheric vacuolation of a ganglion cell.

FIG. 6.—Central vacuolation.

FIG. 7.—Fatty degeneration of a ganglion cell.

FIG. 8.—Almost total destruction of the cell body.

FIG. 9.—Beginning emigration of the nucleolus.

FIG. 10.—The nucleolus lying distinctly outside the nucleus.

FIG. 11.—Vacuolation and beginning destruction of the nucleus of a ganglion cell.

FIG. 12.—Complete necrosis of a ganglion cell.

FIG. 13.—Œdema of the retina : (*a*) empty cavities of various sizes in the stroma, (*b*) exudation replacing a cell, (*c*) thickened Müller's fibres.

FIG. 14.—Œdema of the retina : (*a*) breaking down of rods and cones, (*b*) formation of sharply outlined cavities, (*c*) hypertrophy of the outer nuclear layer, (*d*) a nucleus in the act of passing through the limitans externa, (*e*) separation of cells by œdema.

A CONTRIBUTION TO THE SUBJECT OF TUBERCULOSIS OF THE CONJUNCTIVA.

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THE fact that tuberculosis of the eye appears for the most part without signs of tuberculosis elsewhere, and often in perfectly healthy persons, and the fact further that its course is often mild and benign, long kept us from studying this form of disease, so that our knowledge of it dates back only a few decades. Disseminate tuberculosis of the choroid is excepted, of course, for that was recognized very early as a symptom of acute miliary tuberculosis, and proper importance was attached to it.

Only since 1873, when Perls wrote on tuberculous iridocyclitis, has the literature of chronic tuberculosis of the eye been gradually increased by reports of cases, but the study was much facilitated by the introduction of methods for discovering the bacillus, and of inoculating the disease in rabbits' eyes. Case after case, however, has shown that the disease is much more frequent than we had supposed, and that only the lack of differential points in diagnosis prevented it from being distinguished from the mass of ulcerous, granular, and simple inflammatory affections. It is noteworthy to observe in the literature with what hesitancy observers admitted that one part of the eye after another was subject to tuberculosis.

In 1867 Virchow considered the conjunctiva immune to tuberculosis. In 1870 the first cases of tuberculous con-

junctivitis were reported. In 1887 Amiet collected 47 reported cases, and in 1895 Denig found 73. I am adding another case to this number, not because the disease is relatively rare, but because my case differed in etiology and symptomatology from the most, and because of the therapeutic measures employed.

C. L., a printer, aged twenty-seven ; father living, and healthy ; mother and a maternal uncle died of phthisis ; patient's brothers and sisters well. The patient has never been robust, and has suffered from catarrhs of all sorts, but has never been seriously ill. In 1890 he noticed lachrymation of the left eye, and a year later the canaliculus was split, and the lachrymal duct probed, after which there was some improvement. At this time he was under treatment for a catarrh of the apex of the lung. Three months later a small swelling was noticed on the upper lid, and in time it grew larger. In the spring of 1893 this nodule was removed, but later several more appeared. In 1894 these were operated on several times, and the lid treated with caustics and the cautery.

On February 19, 1896, the patient first visited this clinic. He had no pain, and he complained only of an annoying feeling of heat and tension, of lachrymation, and of the deformity caused by the greatly swollen and reddened left upper lid. His general health was good, except for a cough of long standing, with expectoration, chiefly in the morning. No cause for the eye trouble was known to the patient. Syphilis was denied.

On examination the right eye was found to be normal. LV = $\frac{5}{8}$. Left upper lid greatly swollen ; the skin reddened and smooth. When the lower lid was everted, in the hyperæmic tarsal conjunctiva were seen two nodules of elongated form, with their apices together, lying parallel to the margin of the lid. They were 3 mm long, 1.5 mm broad, and 2 mm high, with a smooth surface, of a red color, translucent, soft, and suggesting frog-spawn trachoma granulations. Internal to these was a smaller nodule about the size of a pinhead.

Through the upper lid could be felt hard irregular nodules. When everted, there appeared a tumor of dark red color and irregular surface. Nodular formations, elevations suggesting granulations, and pointed condylomata, alternated with superficial and deep ulcers covered with muco-purulent secretion.

Among these were seen white linear or branched scars. The number of these small irregularities with their dark red color, opaqueness, and firmer consistency, was in marked contrast with the changes found in the lower lid. The upper retro-tarsal fold projected as a thick red tumor, while the bulbar conjunctiva exhibits no abnormalities excepting a hyperæmia. The cornea was intact. The iris was normal, and the pupillary reaction prompt. The media were clear, and the fundus normal. On the left temple 1.5 *cm* from the outer commissure of the lids, there was a small red spot with an ulcer at its centre, which had existed for eighteen months. The left preauricular gland was much swollen.

We had to do with a man of medium size, slightly developed musculature, and little panniculus. The color of his face is normal. Nasal breathing is obstructed by a chronic hypertrophic rhinitis. The voice is hoarse, but the larynx is normal, except for hyperæmia of the cords.

The apex of the right lung is somewhat retracted, and dull on percussion. Over the left apex, also, dulness, and fine dry râles. Other organs normal.

A probable diagnosis of tuberculosis of the conjunctiva was made, and examination of the sputum revealed the presence of the tubercle bacillus.

On February 22d the two larger nodules were removed together from the lower lid, as was a large portion of the conjunctiva of the upper lid, and the cutaneous ulcer on the temple. Examination of the parts removed, showed the process to be tuberculous, and it was decided that a radical operation should be done. On March 2d this was undertaken under chloroform. The tarsus of the upper lid was removed, and all diseased portions of the conjunctiva excised. Two weeks later no signs of tuberculosis could be found, the condition of the eye was satisfactory, and the patient's general health was improving under tonic treatment.

In this case conjunctival tuberculosis appeared in consequence of pulmonary tuberculosis. This condition is so rare that only three similar reports can be found in the literature. Hock described such a case in 1875— a physician of sixty-two, with pulmonary tuberculosis, suffered with a deep ulcer of the skin of the upper lid having notched margins, and extending deep into the tarsus. Recovery

followed cauterization with the silver stick. Some weeks later death occurred from the disease of the lungs. The second case was reported by Maren, in 1884,—a boy of six with an affection of the eye that did not yield to treatment and continued over a year, died of phthisis pulmonum. The ulcer of the tarsal conjunctiva with its infiltrated margins, finally destroyed the entire upper conjunctiva, and attacked the tarsus and the lid margin. No surgical treatment was employed.

Wagenmann's patient (1888) had suffered off and on for six years with hæmoptysis, and still had a cough with expectoration. There was found a nodular infiltration of the conjunctiva at the corneal margin, which broke down. After excision and cauterization there was complete recovery. A year later the patient died of his pulmonary affection.

Besides these three cases there are thirteen others reported in which the conjunctival affection was complicated with tuberculosis of other organs. In three of these there was disease of the lachrymal sac, and in six lupus of the face, the eye becoming affected by direct extension, so that only four of the thirteen cases can really be regarded as being due to secondary infection. Opposed to this small number are fifty-two cases of ocular tuberculosis in which no signs of tuberculosis in other organs were found. It is, therefore, natural to regard tuberculosis of the eye as a local disease, and this has been done from the first, Köster in 1873 taking this view.

Just as it is rare in cases of ocular tuberculosis to find tuberculosis in other organs, so in cases of tuberculosis in general it is rare to find ocular complications. Denig examined 250 tuberculous patients, finding choroidal changes in four and conjunctival tuberculosis in none. He proposed to divide cases of ocular tuberculosis into two categories, which also differed as regards prognosis. These were, first, a local tuberculosis in the sense of a primary inoculation of the eye, with but slight tendency to metastasis, corresponding to local tuberculosis of the lungs or bones—the larger class and of more favorable prognosis; and, second, cases of

tuberculosis of the eye which were to be considered "as metastases from a primary focus elsewhere in the body"—a rarer form with a less favorable prognosis.

But our case, and cases of conjunctival tuberculosis in general, cannot be included in either of these categories, since, as Leber and Wagenmann showed as long ago as 1881, conjunctival tuberculosis does not as a rule arise from a metastatic infection through the circulation but from ectogenous infection. In the cases without simultaneous tuberculosis elsewhere in the body the manner of infection is often hard to follow, since the tubercle bacillus cannot be transferred as easily as the diphtheria and other bacilli, and the conditions must be very favorable for its development. In cases in which there is already a focus of tuberculosis elsewhere in the body,—in our case this was in the lung,—which, according to Denig's idea, must be classed in his second category, the supposition that the disease arose through metastasis is much more forced than that of direct infection from without. It is in fact strange that the phthisical who use the same handkerchief for the mouth, nose, and eyes do not often acquire a tuberculosis of the conjunctiva; and this is only due to the fact, which Valude demonstrated experimentally, that the conjunctiva, when its epithelium is intact, possesses in the secretion of tears and the winking of the lids means of protection against the tubercle bacilli even when they are introduced in pure culture into the conjunctival sac.

When these protecting measures are absent or reduced by injury or chronic inflammation, infection easily takes place. Of course there are other means of carrying the infection. Rhein believes the chief cause to be the rubbing of the eyes with the hand, and he finds tuberculosis of the right eye much more frequently than of the left. In our case the left eye was the one affected, but the patient was left-handed. He had also, by scratching the skin of the temple on the same side, brought about a cutaneous tuberculosis at this point.

That tuberculosis of the conjunctiva can arise by external infection in cases of tuberculosis of parts other than the lungs is shown by four cases in the literature. Thus Herter

and Luc each described a case in connection with tuberculous ulcers of the larynx, with multiple ulcers of the skin. Rhein reported a case with tuberculous ulcers of the nose, and Leithold a case with caries of the mastoid after pneumonia and otitis media purulenta.

In these four cases there was a complication on the part of the respiratory tract, but in not a single case was there a tuberculous joint, a tuberculosis of the intestines, or the like, which, in the impossibility of bringing the pus directly into the eye, might be supposed to have given rise to metastatic conjunctivitis.

Therefore it seems fitting to limit the division into local and metastatic ocular tuberculosis to disease of the deeper parts of the eye, such as the iris, choroid, and the like, in which endogenous infection may be assumed to have taken place, corresponding to diseases of the bones and joints; but conjunctival tuberculosis arising from external infection comes into a distinct category.

The prognosis is, of course, worse in cases of simultaneous disease of the respiratory tract, for here it is more difficult to prevent reinfection. The diagnosis must depend upon microscopic examination, for so varying is the clinical picture of conjunctival tuberculosis, and so greatly may it resemble trachoma, syphilis, and even malignant tumors, that a diagnosis from observation alone is difficult. Even in our case there was a certain resemblance to trachoma.

Microscopically, in specimens from the lower lid, I found a marked thickening of the conjunctiva with hypertrophy of the papillæ, and many nodules composed of round cells. Deposited in these nodules were many typical epithelioid tubercles with giant cells and tubercle bacilli. The tuberculous process was limited sharply to the conjunctiva, the glands, the tarsus, and the underlying fibrous tissue being uninvolved. In specimens from the upper lid the process was found to be farther advanced. There had been, apparently, a chronic inflammation of the epithelial elements of the glands with consecutive retention of secretion and cyst formation, and slight infiltration of the surrounding tissues,—changes due to the long-continued inflammation of

the margin of the lid; and besides this, and independent of it, a recent extension of the tuberculous process from the conjunctiva to the chronically inflamed tarsus.

Inoculation tests, as was to have been expected, resulted positively. A bit of a nodule from the lower lid was introduced beneath the skin of the belly in a medium-sized guinea-pig, where, in the course of four weeks, it led to the formation of a large nodule, and swelling of the inguinal glands, in all of which tubercles and tubercle bacilli were found.

As to therapy, palliative measures soon as a positive diagnosis is made. The diseased tissues are to be thoroughly removed, the operation being done in such a way, however, as to avoid as much as possible distortion and deformity from the resulting cicatrices.

In conclusion, I wish to express my thanks to Prof. Schleich for suggesting the subject of this paper, and to Prof. Baumgarten for permission to carry out the microscopic examinations in his institute.

LITERATURE.

1. VIRCHOW, *Die Krankhaften Geschwülste*, 2d Ed., vol. ii.
2. AMIET, Inaug. dissert., *Die tuberk. d. Bindehaut d. Auges*.
3. DENIG, "Ueber die Häufigkeit der Localtuberculosis des Auges," etc., *Arch. f. Augenheilk.*, xxxi., 4.
4. HOCK, "Ueber Tuberculose der Conjunctiva," *Klin. Monatsbl.*, 1875.
5. MAREN, Inaug. dissert., *Beiträge z. Lehre u. d. Augentuberculose*, Strassburg, 1884.
6. WAGENMANN, "Beiträge z. Erkenntniss d. tuberkulösen Erkrankungen," *Graefe's Archiv*, xxxiv., April, 1888.
7. KÖSTER, "Ueber locale Tuberculose," *Centralbl. f. med. Wissensch.*, 1873.
8. VALUDE, "Ueber Tuberculose d. Auges," *Report of 19th Meeting of Heidelberg Ophthal. Soc.*, 1887.
9. RHEIN, Inaug. dissert., Würzburg, München, 1886.
10. ALBRAND, "Erfahrung über das Tuberkulin," *Klin. Monatsbl. f. Augenheilk.*, 1891, p. 149.
11. HERTER, "Tuberkulöse Geschwüre d. Conjunctiva," *Char. Ann.*, Nov., 1875.
12. LUC, "De la tuberculose de la conjonctive," Thèse de Paris, 1883.
13. RHEIN, "Ueber einen Fall von Conjunctivaltuberkulose," *Münch. med. Wochenschr.*, xxxiii., 13-14, 1896.
14. LEITHOLD, Inaug. dissert., Hall, 1889.
15. RHEIN, "Folliculöse Erkrankungen d. Bindehaut d. Auges," *Arch. f. Augenheilk.*, xxxiv., 3.

EXPERIENCES AND STUDIES WITH REGARD TO STRABISMUS.

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WHEN a physician realizes that the lengthier portion of his life-work is in the past, the question is apt to occur to him how far his own experience has corroborated the instruction upon which he relied when he began practice. At the university we are primarily taught to believe in the words of our teachers; personal conviction of the correctness of that teaching, together with personal wisdom and knowledge, develop gradually from experience. Usually the high estimation with regard to his own executive ability which accompanies the young physician in the beginning of his practice, suffers quite a fall; the ground on which he rests, as he supposed so firmly established, begins to tremble; there comes a time of doubt and uncertainty;—then finally his personal experience gives him a firm ground on which to stand, but only after a part of his cherished ideas have been sacrificed as untenable.

In no other department of ophthalmic work has there been with me such a revolution of conviction as with regard to strabismus and the operations therefor. As I began practice in the spring of 1861, I naturally relied on von Graefe's teaching. If for the present we disregard the true cause of strabismus, it is very remarkable that at its commencement children complain either not at all, or, at most, only temporarily of diplopia. They do not hold their heads obliquely to correspond to the deviation of the eyes, they

have no ocular vertigo, or closure of the eyes to avoid dizziness—in short, children with strabismus behave quite differently from adults who are afflicted with paralysis of one of the muscles of an eye. To explain this difference in the behavior of adults and of children of four years old and under, the convenient theory was advanced that the children forcibly suppressed the image formed in the deviating eye, and that in consequence of this suppression of its image the eye became amblyopic (*amblyopia ex anopsia*). The natural therapeutic sequence of this theory was that children with strabismus should be operated on at as early a period as possible. Von Graefe says in the *Archiv f. Ophthalmologie*, 1857, No. 2, page 223, that the bringing about of an approximately correct position of the eyes by means of the operation for strabismus is indicated for two reasons: first, in order that the suppressed visual action of the deviating eye may be brought into use again, as this is lessened by eccentricity of the retinal image; and second, because the visual power will be increased, and through these two effects the sensory value of the retinal image will be raised. In a note on page 238, he adds that the maxim to postpone the operation until the intelligence of the child has developed, and the sense of beauty awakened, is wholly wrong. Without the sense of beauty, and without intelligence on the part of the patient, more will be accomplished under all circumstances with tolerably sound muscles and good visual power, than when the latter desiderata are absent. For example, if the uninstructed child has active diplopia, and if the impulse for fusion exists physiologically, far more will be accomplished instinctively to regulate the position of the eyes than in adults under similar circumstances, as they require persistent practice.

This theory that the amblyopia of the deviating eye depends on lack of use is no longer tenable. If it were true, the degree of amblyopia would be proportional to the degree of strabismus, but this is not at all the case; on the contrary we find the highest degree of amblyopia coincident with the beginning of a squint, and a very good acuteness of vision associated with a unilateral strabismus of long standing.

After the strabismus has been corrected, either spontaneously or as the result of an operation, the eye remains just as amblyopic as before; all attempts directed to improvement of the vision of the amblyopic eye have proved disappointing, and therefore there is no reason to expect such an improvement unless the faulty vision may be shown to depend upon an objective, remediable cause. There is at all times an element of uncertainty present when we are wholly dependent on the subjective statements of the patient for the determination of the vision of an eye. In other organs of the body the result of non-use is atrophy, but in spite of long-persistent unilateral strabismus, the so-called amblyopia ex anopsia never results in optic atrophy. All this has been dealt with by A. Graefe (*Graefe und Saemisch*, vol. vi., 1880). Schweigger added the observation that a similar unilateral amblyopia was to be met with among those who did not have strabismus, a form which cannot be called amblyopia ex anopsia, but is known as congenital (Schweigger, *Klinische Untersuchung über das Schielen*, 1881).

There is as yet only negative evidence that the amblyopia of strabismus is congenital; it has not yet been explained why children who begin to squint should behave differently from adults who are attacked with muscular paralysis, particularly when in the latter the affected eye is congenitally amblyopic; and the difficulty has not yet been cleared up as to the explanation of the existence of this unilateral amblyopia where there is or is not strabismus.

Von Graefe's theory of the suppression of the visual image was based on the assumption that the normal binocular single vision of adults is a congenital attribute which results from the normal construction of the eye, but if our present views in regard to the embryological anatomy of the eye are correct this position is untenable. The anatomical structure of the eye alone is congenital, and while it will be readily admitted that the brightest visual impressions come through the macula lutea, the child is obliged to learn to use his eyes in the same way that he has to learn to use his other sensory organs. Herein lies the great difference between the as yet imperfectly developed sight of a child

during the early years of its life up to the time when the strabismus appears, and the perfectly developed sight of an adult. How imperfect the vision of the newly born infant must be may be inferred from the fact that in the eighth fœtal month, when a child is viable in case of a premature birth, the entire visual tract, from the eye to the transcortical system of association fibres, consists only of axis cylinders without medullary sheaths, and there is, therefore, no possibility as yet of an isolated conductivity on the part of these nerve fibres; together with the fact that at the time of birth the formation of medullary sheaths has begun in the optic nerve, but requires some months to extend in a centripetal direction from the periphery until completed in the transcortical area,—according to Fleischsig, at about the end of the tenth month. Before the expiration of this time, correct visual perceptions on the part of the child are altogether impossible, for they are brought about through the connection between the visual centre in the gray cortex of the occipital lobe and the centres of all the other organs of sense, the motor centres of the muscles of the eye, the motor speech centres, the motor centres of the limbs, especially the motor centre for the right hand,—the centres, in short, of all the motor and sensory parts of the body. The true appreciation of space, as well as of the form and color of the objects seen, is obtained through the mutually correspondent activity of all the transcortical systems of association fibres—that is, through the association in the cortex of the occipital lobe between the visual impression of a certain object and the impression made by the same object upon the other centres of the organs of sense and the motor centres; in other words, the child attains the conscious use of his eyes in accordance with reason at the same time that he attains the like use of the other organs of special sense. While one child will be more forward than another, just as in learning to speak, about four years of its life will elapse before the intricate nervous tracts are anatomically completed, and their use thoroughly learned. It cannot be that the newly born infant receives anything more than an indistinct impression of light and dark, for it has no knowledge of space, form,

or color. Gradually, in association with the anatomical development and the functional exercise of the nervous tract, visual perception and finally visual appreciation are developed. Baumgarten was right when he suggested, in 1840 or 1841, that an infant during the first few weeks of life perceived only a quantitative impression of light, although von Graefe pronounced him in error. Baumgarten's error was in the explanation which he advanced to account for his correct observation,—that the macula lutea was developed after birth; while the true cause is to be found in the medullary sheaths in the optic nerve. That normal binocular fixation is not a faculty given man at his birth (in accordance with the nativistic theory), but is an attribute which must be acquired by long experience and study (the empirical theory), is supported by the testimony of every patient who, blind from birth or from early childhood from cataract, has had this removed at a period of life when, in consequence of the development of the understanding, reliable information can be obtained as to the impressions made by the pictures of the outer world which for the first time fall unhindered on the retina. These patients need to touch objects to gain a knowledge and understanding of them; they are very uncertain in their estimates of distances and of movements; they do not correctly recognize colors, and they are also in a condition of psychical blindness,—which demonstrates that the use of all the associated nervous tracts of the visual centre, which is necessary for perfectly intelligent vision, has not yet been learned. This condition of psychical blindness, or sensory anopsia, might be denominated a physiological form to distinguish it from the pathological form which is occasioned by interference with the functional activity of the same nervous tracts by a pathological lesion. So even if it should be granted that the medullary sheaths are all formed in the region of the visual centre in a child at the time of its birth, and that thus an acute perception of the objects in the outer world is possible, the child would still be in a condition of physiological psychical blindness, and must remain so until, by the help of its other senses and its organs of motion, it has obtained

a correct understanding of the images formed on its retinas, in other words, until it has learned the intelligent use of its eyes and of its sensory organs in general. Although the testimony of persons born blind and operated on in adult life has been known since the publication of Cheselden's frequently quoted case (*Philosophical Transactions*, 1728, page 447), von Graefe did not take this and the inferences to be deduced from this in regard to the development of the normal act of vision in children into account when he propounded his theory of the suppression of the vision of the deviating eye in strabismus. How slightly the knowledge of how to see, learned prior to the age of four years is established, can be shown by those cases in which, with no pathological lesion in the eyes, there existed for months an apparent blindness on account of blepharospasm. The first observation of this nature was made by von Graefe, who believed the bad vision was the result of pressure, as in glaucoma. This explanation was accepted by R. Schirmer, on the occasion of his publication of two other cases, but Th. Leber did not accept it, because there were no appearances of a glaucomatous condition, and he was the first to correctly perceive that we have to deal here with a re-learning of the act of vision, analogous to the learning again of speech by children who have lost their hearing before the acquired command of language was firmly established, an opinion with which Samelsohn coincided. There are only seven cases of such children under the age of four years recorded, though many more must have occurred, but this is not surprising, as the condition is one which, of itself, is unimportant, the patients recover of themselves, and the observations are of no practical, though of great scientific, value. What the child learned before the attack it soon learns again after the removal of the blepharospasm, for the condition is not one of true blindness, but of a retrogression into the psychical blindness normally present in every child before it has learned to see. If the knowledge of how to see has been thoroughly acquired, as in adults, then a long closure of the eyes does not result in a state of psychical blindness any more than an adult loses the power

of speech through deafness. The difference between the visual condition of an eye which has been blinded for some time during the early years of life by blepharospasm and that of an eye from which a congenital cataract has been removed in adult life is only that in the one case it is the taking up again of an interrupted and more or less forgotten study, while in the other it is the actual commencement of the same study, but in neither case is true blindness, or amblyopia, produced. The fact is then that prevention of the use of congenitally normal eyes cannot produce true blindness, but only a condition of psychical blindness which will gradually disappear after the hindrance to the use of the eyes is removed, a fact which does not agree well with the theory of amblyopia ex anopsia. It is impossible to suppress a sensory organ, for man can suppress only an activity which is under the control of the will, and the sensory organs are not under such control. The use of these organs is unconsciously and involuntarily self-taught to the child, just as the familiar sounds of the mother tongue are learned, independently of the will. The beginning, as well as the highest possible functional development, of the sensory organs in animal organisms, depends on the excitation of the senses by external objects, and so does the development of the eye depend upon its excitation by the rays of light. Animals which live wholly in the dark do not have their eyes developed, and when animals of a race formerly accustomed to live in the light and to use their eyes become dwellers in the dark their eyes gradually become rudimentary or disappear. The excitation of light is sufficient to develop the functional activity of the eye; under its influence the formation of the medullary sheaths gradually extends in the optic nerve from the periphery, and its forcing influence is such that the formation of the medullary sheaths takes place so rapidly in a child born in the eighth fetal month that at the end of a month the process is further advanced than it is in a child born at full term. From the foregoing it seems to me that the theory that the unilateral amblyopia of the deviating eye in strabismus is an amblyopia ex anopsia, and results from suppression of the normal visual act,

is an embryologico-anatomical chimæra. The amblyopia can only be congenital; the fact that children who begin to squint do not suffer from diplopia as do adults is a proof that binocular single vision has either not been learned by them at all, or, if they have temporary diplopia, been developed so imperfectly that it should be forthwith learned again. The final cause of all cases of strabismus must be absent or imperfectly learned binocular single vision, so that binocular fixation, instead of passing over into binocular single vision is lost under the influence of the strength of the extrinsic muscles. When binocular single vision is absent an eye may have normal vision and yet deviate, but when it is well developed, even though the vision is congenitally poor, there will never be strabismus. Of course unilateral bad vision, from astigmatism, corneal opacities, unlike refraction in the two eyes, or a high degree of hypermetropia with the accompanying tax on the accommodation, favors the imperfect development of binocular single vision, and therefore the beginning of strabismus, but it is not the exciting cause of the latter, for all of these conditions may be present and yet there be no strabismus, because binocular single vision has been developed.

The relation of corresponding points in the retina normally associated with binocular single vision is equally as little a congenital condition, it also is learned and developed during life. If a child four years old begins to squint because binocular single vision has been learned either imperfectly or not at all, there can be no normal relation of corresponding points in the two retinas, for the latter certainly results from a normally learned binocular act of vision. But the learning to see is not completed when the strabismus begins, the child continues to learn in spite of it, and because only thus can it learn to localize correctly the objects seen, there comes about a certain localization of images on the retina of the deviating eye, to the extent to which it can be brought into use, which does not agree with the relation of corresponding points of normal fixation and normal binocular single vision. As the result of the strabismus a quite abnormal relation of corresponding points is developed, in-

congruence of the retina, an event just as comprehensible as the development of the so-called normal relation of corresponding points in the non-strabismic eye, because the relation of corresponding points in our retinas is not a congenital attribute of the eyes, but is learned and developed during life. A. Graefe in his latest work takes a similar ground with regard to the development of the relation of the corresponding points in our retinas, but in regard to normal binocular single vision he adheres remarkably to the idea that this is a congenital attribute, and to the theory that the non-appearance of diplopia in strabismus is due to the suppression, or exclusion, of the image formed on the retina of the deviating eye. He arrives at the singular conclusion that a person with strabismus has single vision for two reasons, because of the suppression of the image in the deviating eye, and because of the incongruence of the retina. The disturbance of binocular single vision in a person with strabismus, he says, depends upon exclusion, or on a formation of new relations of corresponding points, or in a combination of both of these events, and the individually different degrees of perfection of these two conditions, together with the particular form of their combination, occasion the varying manifestations of that disturbance. If, as I believe, the normal binocular single vision and the closely connected relation of corresponding points are not congenital, but are learned and developed attributes of our eyes, there is only one cause for single vision in strabismus and I may thus formulate the proposition: The lack of binocular single vision in strabismus, as well as the formation of incorrect relations of corresponding points, depends upon a failure to acquire, or a defective acquisition of, the act of vision in both eyes during the first few years of life. The varying manifestations depend upon the individually different degree of defect in this acquisition.

Not only are normal binocular vision and the associated relation of corresponding points in the retinas developed after birth, but the co-ordinated movements of the eyes and of the lids, whether associated, accommodative, or both combined, are also not congenital. This has been determined by W. Preyer (*Die Seele des Kindes*, Leipzig, Th.

Griber's Verlag), who made daily observations on his own child from its birth until the end of its third year. According to his observations the movements of the lids in the newly born infant are quite lacking in symmetry. One eye may remain open while the other is closed and when both are open they are during the first month apt to be unequally so; at this time too the lids may be raised when the eye is looking downward, and then may not accompany the motion when the eye looks upward, so it appears that the separate nerve branches which originate within the oculomotorius region can be innervated independently of each other. Reflex closure of the eyes and contraction of the pupil on account of strong light is congenital, but the reflex closure of the eyes on the approach of objects near them appears first during the third month. Regarding the movements of the eyes, Preyer says: Close and repeated observations of the movements of the eyes taught me that particularly during the first six days the turning of the eyes to the right or the left is not co-ordinated as symmetrically as in adults. Repeatedly I saw in a child whose eyes were wide open purely associated movements which a careful examination showed to be not exactly alike. I found that often one eye moves independently of the other and that the head is turned in the opposite direction to the movements of the eyes, so that it is quite evident that both movements are without aim and that the coincidence of the two in the early days of life is accidental. The movements of both eyes to the right or the left at this time also appear to be accidental, because they only form a part of all possible movements of the eyes. The ability to converge is very marked during these early years, and the movements of the eyes finally become well co-ordinated after the lapse of four years. In closing, Preyer says: All of these observations favor the theory that the conscious act of vision is for the regulation of the movements of the eyes; that after the penetration of the impression of light to the visual centre a harmonious motor impulse proceeds from the centre to the three nerves which supply the muscles of the eyes, and that at first, while the eye has only the power of receiving light, but not as yet

that of vision, its movements are not associated or co-ordinated. Even if they are found to be symmetrical the great number of atypical movements of the eye immediately exclude the idea of a bilaterally symmetrical nervous mechanism ready to perform its functions at birth. For if man, like chickens and some other animals, brings such a mechanism into the world with him, why must he perform with his eyes so many objectless movements before he can get the full use of that mechanism? It is self-evident that a hereditary tendency to this condition can be easily proven. The common rule that the movements of the muscles of the body become gradually co-ordinated is also true of the muscles of the eye. There is then no preformed organism which from the beginning occasions co-ordinated and symmetrical movements of the eye. Raehlmann, Witkowski, and Schoeler have come to similar conclusions. A newly born infant is unable to fix its gaze on a bright object because fixation is an act of the will, but the infant is at first without will or understanding and is therefore unable to move the eyes in accordance therewith. It stares into space with a stupid expression of countenance, and appears to fix its gaze only when an object is brought into its line of vision, but when that object is removed the position of the eye does not change. Neither can the newly born infant accommodate voluntarily. Although in adults with normally developed binocular single vision both eyes readily accommodate, yet while the child is learning to see it accommodates imperfectly and unequally, otherwise it cannot be explained how, when both eyes are originally in an equally hypermetropic condition, one should become myopic while the other remains hypermetropic, or becomes emmetropic or to a far less degree myopic. Again the occurrence of unilateral congenital paralysis of the abducens proves the possibility of unequal innervation of the muscles of the two eyes during the earliest childhood; the eyes are parallel, convergence is normal, a single lateral motion is produced by the action of the internus of the unaffected eye, and there is no secondary contracture, such as is met with in cases of acquired paralysis. From what has been said it is

evident that for the elucidation of the functional troubles which develop in the eyes of young children we should not trust to the guidance of the already developed functions of the eyes in adults, but should first of all determine the development of that normal physiological condition; we must trace this embryologically and understand it thoroughly before we can correctly recognize and explain deviations therefrom in children, otherwise we will be greatly in error. No matter how cleverly a scientific theory is built up, it becomes untenable as soon as the grounds upon which it is based are shown to be erroneous. A violent suppression of the visual image and a resultant amblyopia ex anopsia does not exist and so far as the teaching in regard to strabismus and its operative treatment is based upon this theory it is wrong.

It cannot be denied that the untenableness of the theory in regard to amblyopia ex anopsia in one eye has created new difficulties for scientific solution. Whence comes this congenital amblyopia, and how is the complete absence of any pathological change in the fundus to be explained? The origin of a marked unilateral amblyopia must be situated peripheral in the chiasm. It is highly improbable that one optic nerve should be developed normally and that the other should not be in the same individual. The amblyopia must originate from a cause situated outside of the optic nerve and the retina which destroyed or retarded the development either before or during the birth of the child. Some light is cast upon this subject by the works of J. Königstein, Bjerrum, and particularly Schleich. The latter by a careful ophthalmoscopic examination found in the eyes of 150 newly born infants the following pathological conditions:

a. In five children (3.3 %) abnormally pale coloring of the sheath of the optic nerve, together with a marked thinness of the blood-vessels.

b. In one child (0.7 %) considerable infiltration of the sheath of the optic nerve and its neighborhood, arteries normal, veins much enlarged, diagnosis choked disk.

c. With extraordinary frequency retinal hemorrhages, 78 times in 49 children (32 %), that is, in both eyes of 29, and in one eye alone of 20 children.

All possible forms and sizes of hemorrhages were found. They all appeared quite fresh and as if occasioned during the act of parturition, while their absorption took place very rapidly, usually in a few days. In 1890 M. Naumoff published a paper on "certain pathologico-anatomical conditions in the fundus of new-born children" (*Archiv f. Ophthalm.*, xxxvi., 3, p. 180). He had examined the eyes of 47 infants born at full term, which had died either during birth or shortly afterward, and had found pathological conditions in 12 pairs of eyes (25.5 %). In addition to these he had examined the eyes of 22 prematurely born children, 10 of the seventh foetal month and 12 of the eighth foetal month, but found among them no pathological changes, although Königstein did find changes in the eyes of such children also. The pathological conditions which Naumoff describes consisted in two cases of choked disk, and in all the others of hemorrhages. The latter had occurred twice in the sheath of the optic nerve, three times in the choroid, and in all the rest of the cases in the different layers of the retina. These hemorrhages had occasionally happened through diapedesis, but usually through rupture of capillaries during parturition. He ascribed as the usual cause of the choked disks and retinal hemorrhages the increase of intracranial pressure during labor by compression of the bones of the skull and of their contents, while vascular engorgement might be held to explain the presence of hemorrhages in various other parts of the eye, such as the choroid and conjunctiva. Naumoff attempted to show the relation of the pathological conditions described by him to the details of labor, and found that, although no particular influence appeared to be exercised by the various presentations of the foetus, or by operative measures undertaken to expedite the labor, yet a narrow pelvis and a prolonged duration of labor appeared to be essential factors in the production of these pathological conditions. His conclusions are as follows:

1. Changes in the eyes of the newly born are found not only after labors which are in certain respects abnormal, but also after those in which the course has been normal.
2. Children of mothers who have narrow pelvises show

pathological changes in the eyes more frequently than those whose mothers have normal pelves.

3. The occurrence of the pathological changes in the eyes of the newly born stands in relation with the duration of labor, no matter what may occasion its prolongation.

4. Such changes occur more frequently in the first-born than in succeeding children, because of the longer duration of labor in primiparæ.

There can be no doubt that these retinal hemorrhages are not without influence on the later function of the eye. If they are small and associated with no considerable change in the structure of the retinal tissue, they may leave behind no appreciable trace, especially if they are situated in the periphery of the retina, but if they have caused destruction of the retinal tissue it may, particularly if the region of the macula is involved, leave behind amblyopia in spite of the fact that they disappear so completely that no lesion can be found with the ophthalmoscope. Amblyopia caused in this manner may be either monolateral or bilateral. Bloch (*Centralblatt f. praktische Augenheilkunde*, xv., p. 134) found among about 116,000 patients seen in Hirschberg's eye clinic at Berlin between the years 1869 and 1890, 438 cases of paralysis of the abducens, 31 of which were congenital. Three of these were shown to be in consequence of a difficult delivery with forceps, while for the others no explanation was given. Why a troublesome diplopia was not observed in any of these cases has already been considered. It has long been known that, aside from the graver injuries, such as contusions and lacerations of the lids, contusions or luxations of the globe, traumatic exophthalmus, fractures of the orbital arch on one or both sides, and fractures of the base of the skull involving the orbit, there may occur such injuries as contusions and lacerations of the optic, abducens, trochlear and facial nerves, laceration of the ophthalmic artery or vein, and lacerations of the muscles of the eyes, but it is of great and practical importance to emphasize the fact that such severe injuries can occur when forceps have not been used if the head of the child is severely compressed by the bones of the pelvis, when the outlet is too small, either

on account of its natural size, or from the presence of an exostosis. Not infrequently an autopsy on a still-born child reveals intracranial hemorrhages. A normal labor certainly gives no guarantee that an injury may not have occurred to one or both optic nerves sufficient to cause an amblyopia which would be designated congenital, although occasioned by an injury during parturition. If such an injury should occur to the optic nerve above the entrance of the vessels an ophthalmoscopic examination after birth would reveal no lesions, and hemorrhages into the retina would quickly disappear, leaving no observable trace, except it may be such an amblyopic disturbance as a central scotoma, in which case the eye will fix excentrically, a condition not infrequently met with in strabismus, where as a rule we have a congenital amblyopia with no observable lesion in the fundus, a normal field of vision, normal color sense, and an unchangeable visual defect. A source of trouble which should not be undervalued may appear in the asymmetrical development of the bones which form the base of the skull, especially of the sphenoid, as abnormalities of the optic foramen or canal must interfere with the development of the optic nerve. I can quote from my own practice a family in which there are two daughters who show a very marked asymmetry of the bony parts of the two sides of the face, so that one side of the face is much smaller than the other. In both cases the eye on the undeveloped side of the face is amblyopic, in one girl to a low degree and associated with strabismus, in the other to a very high degree without true strabismus, although the conformation of the orbit is such as apparently to produce it. In both of these cases it seems certain that the abnormal development of the bones of the skull interfered with the normal development of the involved optic nerve and resulted in characteristic congenital amblyopia with nothing abnormal to be seen in the fundus. These are two extreme cases, but smaller, or less marked, abnormalities appear in the development of the two sides of the skull very frequently. To what degree rickets, scrofula, or congenital syphilis may be causative factors I do not know. The reason why no ophthalmoscopic changes can be observed

in a case of congenital amblyopia occasioned by interference with the development of the optic nerve must be that the injury to the nerve took place at a time when it was not completely developed, that is, when it was composed for the most part of axis cylinders without medullary sheaths, the formation of which afterward advanced quietly in its normal course. In adults the course of events is quite different, because an adult does not possess the same regenerative power that is present at the time of development.

Inasmuch as the acuteness of vision cannot be improved by the correction of the strabismus there is no reason to hasten the performance of an operation, the only effect of which can be to improve the cosmetic appearance, and even this, as a rule, imperfectly on account of the absence of binocular single vision which induces and preserves the correct position of the eyes. In spite of the above-quoted opinion of von Graefe, the best results will be obtained after the intelligence of the patient has developed sufficiently to be of assistance in the treatment. Unfortunately also the operation for strabismus is associated with the production of some little cosmetic defects, such as the sinking of the caruncle and protrusion of the eyeball, and, in order to avoid a production of these defects to too great a degree, a slight remnant of the strabismus is frequently left behind. The most ideal correction of strabismus which I have seen, is that which takes place spontaneously without operation, and I am therefore of the opinion that no case of strabismus should be subjected to an operation until after every hope of obtaining a spontaneous correction by means of wearing the proper glasses to correct the refractive error and of exercise of the weaker antagonist has been exhausted. Whether binocular single vision, which has never been present, or has been only slightly developed, can be permanently learned by means of stereoscopic exercise, or not, I do not know, but it certainly would require such persevering practice for a number of years that it is seldom if ever practicable. No operation should ever be performed before the refractive condition has been determined, for strabismus may be recovered from spontaneously even at the age of twelve or six-

teen years. Not alone the refraction but also the conditions of the extrinsic muscles change with the lapse of years, and the eye of a child who squints on account of an acquired corneal opacity will turn in, while that of an adult with unilateral cataract will turn out, an evidence that with improvement in refraction and increase of age the former preponderance of strength in favor of the interni passes over to the externi. The earlier the period at which a surgeon operates the more certainly will he be disagreeably surprised by the presence of a horrible over-correction, if he should meet with the patient again in after years. The effect of the same operation differs in different individuals on account of the variation in the power with which the antagonist draws the eye over to its side, a power which cannot be previously determined. Von Graefe deplored the uncertainty of judgment in regard to the immediate effect of the operation when performed under chloroform narcosis, but what is there to-day to prevent us from delaying the operation until the patient has become sufficiently intelligent to enable us to obtain a more exact examination and to operate under cocaine alone? The earlier the operation the more uncertain will be the final result.

ABSTRACTS OF THE PAPERS IN VOL. XXXIII.
(1896) OF THE GERMAN EDITION OF
THESE ARCHIVES NOT PRE-
VIOUSLY TRANSLATED.

By DR. COLMAN W. CUTLER.

I.¹—ANTISEPSIS OR ASEPSIS IN OPERATIONS ON THE EYE-
BALL. A COMPARATIVE BACTERIOLOGICAL STUDY.

By DR. LUDWIG BACH, WURZBURG.

DURING the past months, I have used irrigation and at the same time mechanical cleansing of the edges of the lids and of the conjunctival sac with 1-3000 bichloride solution; as the process has been the same as that which I used in the experiments with physiological salt solution, the results provide the means of estimating the relative values of an antiseptic and an aseptic method. The conjunctival sac and the edges of the lids were wiped with cotton wet with 1-3000 bichloride and irrigated at the same time. The results of twenty-five experiments carried out with bichloride are compared with a series of cases which were treated with salt solution alone. The following table shows the results:

Mechanical Cleansing with Irrigation	With antiseptis.	With asepsis.
showed a diminution of the bacteria on the edges of the lids		
in.....	44 %	42 %
showed a diminution of the bacteria in conjunctival sac in..	44 %	30 %
“ sterility of the edges of the lids in.....	56 %	50 %
“ “ “ “ conjunctival sac in.....	40 %	40 %
An apparent increase of bacteria in the conjunctival sac was		
produced by mechanical cleansing in.....	16 %	5 %

¹ The numbers correspond to those of the German edition.

Franke found that with a simple irrigation of the conjunctival sac with antiseptics there was a diminution of bacteria in 24 % and sterility of the conjunctival sac in 0.75 %.

By these experiments it is proven that much more is accomplished by mechanical cleansing with irrigation than by mere irrigation. The comparison shows also that the results are about the same with antiseptics and asepsis. Since there is no advantage to be gained in the use of antiseptics and the solutions in sufficient strength to destroy the bacteria are more or less irritating, their use must be advised against both from a bacteriological and a clinical standpoint.

II.—CONCERNING THE DANGER OF INFECTION IN DIFFERENT OPERATIONS ON THE EYE, AND THE CONDITIONS AFFECTING THE PROGRESS OF SUPPURATION FROM ITS ANTERIOR TO ITS DEEPER PORTIONS.

BY DR. N. ANDOGSKY, ST. PETERSBURG.

The paper is divided into three parts: 1. Injection of india ink into the anterior chamber of rabbits after different operations, to determine what influence the altered currents of the ocular fluids might have on the diffusion of the injected substances. 2. Examination of the aqueous, lens matter, and vitreous to determine their qualities as culture media, especially for the *staphylococcus pyogenes aureus*. 3. The performance of different operations on the eyes of rabbits, followed by inoculation of the eyes with pyogenic cocci, with clinical observation of the results and careful pathological examination.

Under the first head experiments gave the following results: The removal of india ink from the anterior chamber of the normal eye takes place through the spaces of Fontana. The granules may pass through the ciliary body and reach the supra-choroidal space; some are taken up and held by the cells on Descemet's membrane. In the normal eye india ink never passes from the anterior chamber to the vitreous. When injected into the vitreous, it passes in part into the lymph spaces of the optic nerve, but mostly

forward through the zonula of Zinn into the anterior chamber.

After iridectomy or discission, and, in fact, whenever the posterior capsule of the lens and the zonula of Zinn are intact, the course of the india ink remains the same. If the posterior capsule is perforated after extraction of the lens, the current is reversed and the greater part of the ink passes backward through the vitreous in a manner suggesting the existence of a series of funnels converging toward the optic nerve.

Staphylococcus aureus was used to inoculate tubes containing aqueous, aqueous containing fragments of lens matter, and vitreous, and it was found that the mixture of lens matter with aqueous formed by far the most favorable medium for the development of the cocci. This may be explained by the high percentage of albumin in the lens. Aqueous alone delayed the development of the cocci six to nine hours, and probably in the anterior chamber where it is constantly renewed it would be still more effective; and in fact the examination showed that in the normal anterior chamber staphylococci in the quantity of 0.05 cc of a bouillon culture did not increase. Such an injection produced an iridocyclitis with fibrino-purulent exudation, which reached its height in two days, then gradually diminished without spreading to other parts. The organisms are removed from the anterior chamber by phagocytosis and with the exudation, through Fontana's space, but they do not reach the supra-choroidal space nor do they pass into the vitreous if the posterior capsule and zonula are intact.

After discission of the lens, the infection with very small quantities of cocci produces invariably panophthalmitis, since the microbes increase very rapidly in the lens substance. The process makes rapid progress, especially if the posterior capsule is wounded so that they can pass into the vitreous. The same is true after cataract extraction. It has been mentioned that india ink after entering the vitreous penetrates the lymph spaces of the optic nerve; cocci never enter the tissue of the nerve, but are intercepted before reaching its surface by a mass of leucocytes; the

retina and choroid, however, are speedily infiltrated with the purulent exudation. The exemption of the optic nerve is true only when cocci enter the vitreous from the anterior chamber, and not if they are introduced farther back in the vitreous, so that the observation does not militate against Deutschmann's migration theory of sympathetic ophthalmia. Small quantities of a diluted culture of staphylococci injected into an eye from which all remains of the lens have been removed, cause only a mild exudative iritis, even if the posterior capsule is perforated. It is therefore obvious that the presence of the lens substance is of the greatest importance in the development of suppuration.

IV.—THE AMBLYOPIA ASSOCIATED WITH STRABISMUS.

BY DR. **GUILLERY**, COLOGNE.

I have endeavored by the study of the field of vision to throw new light on the question of amblyopia, and have examined the periphery of eyes with strabismus and amblyopia in a manner best adapted to solve the question. Nearly five years ago I recommended the use of a single point for testing the vision, and defended it against the old prejudice that in this manner the light sense, and not the vision, was tested.¹ Recently Groenouw has made use of the same method for the periphery, and has accomplished much more than with colored squares.² Groenouw determined the average distance from the centre at which points from $\frac{1}{4}$ mm to 4 mm diameter were seen by the normal eye, and called these limits isopters. These were almost exactly parallel to the outer limits of the field.

In the present instance, as in my visual tests, each point is placed in different corners of a quadrangle, so that the patient must state where he sees it; this makes the limits narrower than in Groenouw's test, but adds to the accuracy.

The examinations of five cases are given which show central and peripheral amblyopia bearing no typical relation to each other. When peripheral vision was diminished the

¹ These ARCHIVES, German edition, xxiii., 3 and 4, and xxvi., 1.

² These ARCHIVES, German edition, xxvi., 2.

amblyopia was uniformly distributed over the field ; not infrequently, however, central vision was diminished and the function of the periphery normal.

These results are not favorable to the theory of amblyopia from disuse. We know of no influence which would act on both centre and periphery and yet affect them so differently. The causes of amblyopia in strabismic eyes are surely manifold, and it seems vain to attempt to explain the condition from any one standpoint.

V.—IS INTERMARRIAGE A FACTOR IN THE CAUSATION OF PERNICIOUS MYOPIA ?

BY DR. **JULIUS WOLFF**, COLOGNE.

Among 126 patients with myopia of 9 D or more, and with secondary changes and more or less diminished vision, 13 were found whose parents were related. This proportion of 10 per cent. leads the author to conclude that pernicious myopia may be dependent on intermarriage, and that this factor, while not the most important, is the only one established.

VI.—REPORT OF 295 CATARACT OPERATIONS IN PROF. SCHÖLER'S CLINIC, BERLIN.

BY DR. **WALTER ALBRAND**, BERLIN.

This is a continuation of a report published in these ARCHIVES, vol. xxvi. of the German edition.

In the period here reported, from 1892-1895, 144 extractions with iridectomy showed the following results:

CASES	V	$\frac{15}{15}$	$\frac{15}{20}$	$\frac{15}{30}$	$\frac{15}{40}$	$\frac{15}{50}$	$\frac{15}{70}$	$\frac{15}{100}$	$\frac{15}{200}$	Fingers counted at					V not tested	V=0
										15'	10'	5'	3'	1'		
	3	6	17	19	27	17	23	14	1	4	1	1	3	1		7

Five eyes were lost through suppuration ; in 7 there was loss of vitreous ; in 7 cases the operation was followed by severe inflammation of the uveal tract.

One hundred and fifty-one extractions without iridectomy are tabulated as to their vision thus:

V	$\frac{15}{15}$	$\frac{15}{20}$	$\frac{15}{30}$	$\frac{15}{40}$	$\frac{15}{50}$	$\frac{15}{70}$	$\frac{15}{100}$	$\frac{15}{200}$	Fingers counted at				V not tested	V = 0
	15'	10'	3'	1'					15'	10'	3'	1'		
CASES	7	6	14	26	16	17	31	15	5	3	1	1	3	6

Suppuration occurred in 2 cases; loss of vitreous in 6; in 3 of these cases $\frac{1}{4}$ of the normal vitreous escaped, but V was ultimately $\frac{15}{40}$, $\frac{15}{100}$, and $\frac{15}{30}$. Severe inflammation of the uveal tract occurred 12 times during the after-treatment, aside from wound infection, one of these being followed by sympathetic ophthalmia. In this case the iris prolapsed on the fourth day, and, while not protruding, it filled the entire wound. Iridectomy downwards and in the fourth week discission of secondary cataract gave V of $\frac{15}{30}$. After 2 weeks, sympathetic ophthalmia of the other eye appeared and vision of $\frac{1}{2}$ remained after prompt enucleation of the exciting eye. The hardly perceptible iridochoroiditis was undoubtedly due to infection of the incarcerated iris.

In one case after extraction with discission in the fourth week, glaucoma made its appearance suddenly, 3 weeks later. This was relieved by repeated puncture, with V = $\frac{15}{30}$.

Prolapse of the iris took place 10 times.

Because of a series of cases, which seemed to accompany the simple extraction, of severe iridocyclitis with hypopyon, occurring in a period of several months, without infection of the corneal wound and from 8 to 14 days after the operation, the tendency has been to return to extraction with iridectomy.

VII.—A CASE OF PARALYSIS OF THE TRIGEMINUS.

BY DR. J. K. A. WERTHEIM SALOMONSON AND DR. C. H. A. WESTHOFF, AMSTERDAM.

Isaac K., æt. 54, suffered from December, 1894, with bilateral frontal headache. At first the pain was boring and throbbing, but gradually diminished. At the end of March he had a feeling of icy coldness in the right side of his face which has lasted

since then. In February, for some time, he had tinnitus. Since April he has had frequent nosebleed from the right nostril and the ala nasi on this side is somewhat swollen. Since March he has been able to chew well only on the left side. During the last of April the right eye became inflamed and vision diminished on that side.

There is nothing notable in the family history. He contracted syphilis thirty years previously and has suffered since then at intervals with tertiary manifestations. Present condition: Well-built man, slightly bent, tortuous temporals, numerous scars on legs and elsewhere more or less recent. The right conjunctiva bulbi is much injected and shows numerous vessels, coursing for the most part radially. A ring, 2 mm broad, of transparent pellicle, extends from the limbus towards the centre of the cornea; it contains no blood-vessels, and the inner margin may be raised a little with a probe. The epithelium of the centre of the cornea is intact, but there is a diffuse interstitial opacity. The eye is normally moist. Cornea and conjunctiva are anæsthetic, motility normal. The pupil reacts to atropine. Tn. V = $\frac{2}{6}$. O.S., V = $\frac{5}{8}$. Ophthalmoscopic examination and field normal. The right ala nasi is swollen, infiltrated, and dark red; on its inner side are several rhagades covered with crusts. Sense of smell somewhat depressed. The area of the right trigeminus is entirely anæsthetic for touch, temperature, and pain; the motor portion of the nerve is also paralyzed. The electrical examination shows reaction of degeneration in the right temporal, masseter, and digastric. Slight paresis of right facial. The right palatoglossal arch is higher than the left and the uvula deflected to the right. Larynx normal. Taste is lost over the right anterior two thirds of the tongue. The right facial reflex absent, other reflexes normal.

Under continued mixed treatment and mild bichloride collyrium, the hypertrophic margin of the cornea gradually disappeared, but the interstitial opacity remained. Towards the end of May sensation for temperature improved slightly, but was again lost. Gradually bulbar symptoms appeared, followed by unconsciousness and death. No autopsy.

Among recent investigators Gaule has thrown some light on the subject of neuro-paralytic keratitis. He repeated Claude Bernard's experiments and proved that only

when the trigeminus was divided at the Gasserian ganglion, or peripherally from it, was it followed by keratitis. Also in partial lesions of the ganglion there was usually keratitis, and in these cases there was found to be an intense neuritis. Turner concludes that there is no proof of the existence of a trophic influence of the trigeminus, and that irritative processes in the nerves are essential. From the recent investigations of Gaule, Gastell, Winkler, Samuel, and others, it would seem that the trophic influence of the nerve cell is nothing specific, but merely a variety of its normal function, and is inseparable from this. The dystrophy which takes place with a loss of life is for the most part a sign of the irritability of dying fibres. When keratitis neuro-paralytica occurs, we must assume that there has been an excitation of the nerve stump which may suffice to cause keratitis even if conduction is not interrupted.

In this case there was no ulceration of the cornea, but a marked hypertrophy of the conjunctiva extending as a broad, smooth ring over the cornea. The ulcerations and infiltration about the nose were tertiary syphilitic in character, but altered by the morbid nerve influence. Snellen's experiments show that there is something needed for the development of neuro-paralytic keratitis besides failure of normal innervation. The exciting causes are numerous; the cornea becomes the point of least resistance. Sensitive nerves are probably anabolic in their action. In the course of skin lesions following neuritis, the changes are at first in the direction of overproduction; there is thickening, and, through the process of excitation, the formation of new layers of epithelium takes place, to be followed later by atrophy and thinning when the nerve cells are dead.

XI.—ANALYSIS OF THE PROCESS OF TOUCHING OBJECTS LOOKED AT.

BY DR. MORITZ SACHS, VIENNA.

I.

In the simplest form of the test of the localizing function or projection, the patient is asked to touch an object quickly

with the previously concealed finger. The object must be seen and must remain fixed. The localization of a visual sensation is given by the situation of the stimulated part of the retina; and certain disturbances in projection may be attributed to disturbances of perception and in the formation of the image, such as opacities, which deflect or scatter the light, or to diminished sensitiveness of the retina in different parts. These factors may be detected by a careful examination of the media and of the field of vision. If this is accepted, there is no place left for the assumption that the localizing power of the retina can be affected primarily as such. In a case described by Exner, the patient felt for the candle flame, as it were, with his eyes, in certain parts of the field, and was unable to localize it, although he was aware when it was covered or exposed. This was undoubtedly due to a diminished sensitiveness of the retina in those parts, which enabled other portions reached only by diffused light to vie in functional activity with those directly in line with the light.

II.

The second point is the influence which the muscular apparatus exerts on localization. In the normal eye "the effort to see an object as clearly as possible, combined with a perception or idea of its position relative to the object just under observation, controls the movements of the eyes."¹ The result of a disturbance of motility is that the usual degree of innervation is not enough to bring the object toward which the attention is directed to the centre of the retina. If the right abducens is paralyzed, and a red glass is placed before the right eye, when a light is held in the sphere of the paralyzed muscle, the red light will appear to the right, and in an attempt to touch the red light, the finger would of course pass to the right of the candle. The red flame is seen to the right of the fixed white flame because the flame forms its image in the right eye on a spot to the left (inwards) from the macula, and because of the

¹ Hering, *Die Lehre vom binocularen Sehen*, 1868, p. 23.

projection belonging to this spot its image is referred farther to the right than that of the normally fixing left eye. The case, observed in this way, is interesting because it is in opposition to a wide-spread idea that in the use of the projection test in cases of paralysis, it is not necessary that the paralyzed eye should intend to see the object in order that the false localization be brought out. If the patient fixes the red light belonging to the paralyzed eye, and attempts to touch it, he will reach still farther to the right than in the first experiment.

With the fixation of the paralyzed eye, the secondary deviation of the healthy eye becomes greater than the primary deviation of the paralyzed eye. This is due to the increased impulse towards the right, which in the healthy eye affects the normal internal rectus; also the error in projection is greater in proportion to the increase of the secondary deviation.

In a case of nearly total bilateral ophthalmoplegia, the movements of the eyes in the horizontal meridian were nearly abolished, while upwards and downwards nearly normal. Double images were crossed when the object was less than 110 *cm* removed and homonymous when the distance was greater. Between 110 *cm* and 125 *cm* the object was seen single. The lateral separation of the double images increased but slightly on moving the object to either side. Projection was correct only in a very small zone; and always when the object was to the right or to the left, the localization would be farther to the given side, and so much the more as the object was moved to the side.

In this case it is noteworthy that with a lateral position of the object, neither of the double images was seen where the object actually was. With monocular projection, the condition was as if the lateral muscle of the examined eye was affected; in proportion as the object was moved to the side, the error in projection increased, although neither eye was turned in the direction where the patient indicated the object to be. The motility of both eyes in the horizontal plane was nearly abolished; the lateral separation of the images increased only slightly; the increasing error in the

projection must then be attributed to the loss of orientation depending on the intended but unattained movement.

It is obvious that the projection test may be utilized as an important aid in diagnosis, especially in those having but one eye, where there is reason to suspect a disturbance of motility.

III.

In the first portion of this paper the share taken by the retina in the occurrence of the projection test was discussed; in the second portion, the part played by the ocular muscles; and there remains to consider the share taken by the hand or upper extremity. We may assume that the act of reaching for a seen object is an attempt to put the hand in that part of the visual field occupied by the object to be touched; but we must not forget that the object before it is touched has aroused no tactile sensation, and is not therefore in an imaginary tactile field. The act of touching requires an innervation from the motor centre of the upper extremity, which, by association fibres, receives its stimulus from the centre of the ocular muscles, or directly from the central projections of the different retinal points. The history of a case illustrates these points: A man with partial right hemiparesis, the upper extremity not being affected, however, had conjugate paralysis of the left lateral muscles (left externus and right internus). There was no diplopia and no defect of the fields of vision. $V = \frac{6}{18}$.

Objects to the right were touched quickly and accurately; when an attempt was made to touch an object in the left half of the field, however, the finger passed with peculiar uncertainty on each side of it and even above or below, and not, as one would expect from the nature of the ocular paralysis, outwards or farther to the left. The object was distinctly seen during the attempts to touch it.

In order to explain this case we must assume a lesion of the above-mentioned association fibres.

There follows a theoretical discussion which can hardly be abstracted, and for which reference must be made to the original.

XII.—ADVANCEMENT OF THE LEVATOR PALPEBRÆ SUPERIORIS WITH DIVISION OF ITS INSERTION. TWO NEW METHODS IN CONGENITAL PTOSIS.

BY DR. HUGO WOLFF, BERLIN.

The various methods of operating for ptosis are reviewed from the time of von Graefe to Eversbusch, who again drew attention to the levator palpebræ superioris.

The principal insertion of the levator is in the anterior surface of the tarsus about midway between the free margin and the convex border. It is parallel to the free margin, and is separated from the underlying upper half of the tarsus by loose connective tissue, so that the tendon is easy to isolate. The tendon is as strong as the tendon of one of the lateral muscles. From its anterior surface prolongations pass forward to the orbicularis and to the skin. The fact that the distinct line of insertion of the levator tendon is found 5 *mm* below the convex border deserves consideration from a surgical standpoint.

The same principle that Schweigger has applied to the lateral muscles may be used for the advancement of the levator. In the middle of its fan-shaped portion, a piece about 1 *cm* broad may be isolated and the central end brought forward and attached to the stump of the tendon at its insertion into the tarsus. In a case described, the levator was isolated upon two strabismus hooks, a portion about 7 *mm* long, corresponding to the difference in the height of the lids, was removed, and the muscle brought forward and sutured to its stump. The result was satisfactory and has not diminished in six months.

This method is useful where the lid is thick or the orbicularis overacts, in which case a portion may be excised; and where, because of symblepharon, the conjunctival approach to the levator is difficult.

To reach the levator and Müller's muscle from the conjunctival side it is necessary to evert the lid, then with a forceps to seize the convex border of the tarsus and evert it a second time. The conjunctiva is divided horizontally for 2 *mm*, exposing the levator and Müller's muscle, which latter may be

resected and sutured to its stump at the convex border. Three cases have been under observation for 7, 6, and 4 months, and the result has been satisfactory and has remained constant.

The assumption of the congenital absence of the levator is not sufficiently supported by autopsies.¹ And, on the other hand, there are reports of autopsies which show the presence of the levator in congenital ptosis.² According to Kunn,³ the degree of the ptosis has no bearing on the functional activity of the levator. "Ptosis may be slight and the levator not able to raise the lid higher, and on the other hand in complete ptosis, by a strong voluntary effort, it may be raised considerably."

In some cases the presence and activity of the levator may be demonstrated. If one lid is held closed by the finger, and the patient looks upward as far as possible, the lid of the other eye is raised to its normal height. This may be explained by the equal distribution of nerve energy to all the muscles of the eye. The closed eye receives an increased impulse which is shared by the other side. If the lid remains motionless the exaggerated action shows itself in the rectus superior.

These operations are indicated in congenital ptosis of moderate degree where shortening of the levator from 4 to 6 mm is required, wherever the muscle shows signs of functional activity.

XVI.—STATISTICAL CONTRIBUTION TO THE STUDY OF CONGENITAL AMBLYOPIA.

BY DR. M. STRAUB, AMSTERDAM.

The first portion of this paper contains a review of the literature of the subject, including references to a number of cases reported by ten authors, in which the vision of amblyopic eyes has improved after squint operations and

¹ Heuck, "Ueber angeborenen vererbten Beweglichkeitsdefect der Augen," *Klin. Monatsbl. f. Augenh.*, 1879, p. 253.

² Siemerling, "Anatom. Befund bei Einseitiger Congen. Ptosis," *Arch. f. Psych. und Nervenkr.*, Bd. xxiii., 1892, p. 764.

³ C. Kunn, "Die angebor. Beweglichkeitsdefecte des Auges," *Beiträge zur Augenheilkunde*, Heft xix., 1895, p. 20.

exercises. The attempts to explain congenital amblyopia by retinal hemorrhage or traumatism at birth are briefly referred to.

In the selection of cases of amblyopia, those due to errors of refraction must be eliminated, and to this end the author establishes the degrees of vision that may be expected in hypermetropia and astigmatism in eyes otherwise normal. In myopia defective vision usually depends on visible changes at the posterior pole of the eye, so that it does not enter into a consideration of the question of amblyopia. Vision of $\frac{3}{4}$ may be considered normal for H. 0.5 D—H. 2.5 D, and vision of $\frac{1}{3}$ is given as normal for H. 3. D—H. 7. D. In astigmatism of all degrees normal vision in the cases here tabulated ranges between $\frac{1}{2}$ and $\frac{1}{4}$.

The results of the examination of 159 cases of amblyopia gave 37 % with strabismus, 62 % lacking binocular vision (including strabismus), 60 % anisometropia, and 17 % isometropia having binocular vision. From this the conclusion is reached that because of the number of cases (17 %) of amblyopia with binocular vision and equal refraction, the explanation of amblyopia from disuse fails, and a primary defect must be assumed as a cause of the amblyopia. Hypermetropia was found in 51 % of the amblyopic eyes examined, and this was the more surprising as there were but 151 cases of hypermetropia among all the eyes examined, as compared with 373 cases of astigmatism. Further, the hypermetropic eyes of the anisometropes are most often amblyopic, the better eye being emmetropic or slightly hypermetropic. Why, then, is it that a congenitally amblyopic eye in the large majority of cases is hypermetropic? The inevitable answer is that it retains the congenital refraction, the normal hypermetropia of infancy, because it does not develop into emmetropia as does the healthy eye. In other words, probably as a result of traumatism during birth,¹ exceptionally both eyes, oftenest one eye, becomes inferior, and as a result remains hypermetropic, does not

¹ Königstein, *Medic. Jahrbücher der K. K. Gesellschaft der Aerzte in Wien*, 1881. Schleich, *Mittheilungen aus der Ophthal. Klinik in Tübingen*, 1884. Naumhoff, *Arch. f. Ophthal.*, xxxvi., 3, 1890.

share in binocular vision, and, in a smaller percentage of cases, squints. In most of the cases of amblyopia examined there was found a scotoma for small objects, of 5° or 10° near the fixation point, while the periphery was normal.

Congenital amblyopia may be divided clinically into several groups: amblyopia with emmetropia; monocular amblyopia with isometropia; monocular amblyopia with ammetropia and with emmetropia of the better eye; amblyopia of the more hypermetropic of two hypermetropic eyes. A consideration of these groups with the aid of numerous tables leads to the conclusion that neither strabismus nor the absence of binocular vision is enough, in general, to explain monocular amblyopia; anisometropia might better be assumed as a cause were that not opposed by the association of amblyopia and isometropia. If, finally, anisometropia is not the cause of amblyopia, then the opposite is true, as the association between the two is established.

XVIII.—INVESTIGATIONS AS TO THE OCCURRENCE OF STRIATED OPACITIES OF THE CORNEA.

BY PROF. **HESS**, LEIPSIC.

The author defends his position that the opacities following cataract extraction are due to folding of the deeper layers of the cornea, caused by a difference in tension between the horizontal and vertical meridians of the cornea after its section, which acts as if the cornea were compressed from the sides. The paper is a polemic, dealing with the opinions of Nuël, Müller, and Schirmer.

One pathological examination is given, supporting the thesis in full. In this case the striated opacities followed a perforating wound of the cornea, and had persisted for eleven years. In the deepest layers of the cornea was a system of ten or twelve fine grayish lines, radiating from the cicatrix, similar in appearance to those following cataract extraction. Descemet's membrane with its epithelium was normal; the deepest layers of the cornea were folded as described in a previous paper. There was no sign of œdema, which, moreover, would be an untenable explanation because of the long duration of the case.

Literature.

LAQUEUR, *Bericht über die 19. Versammlung der ophthalmologischen Gesellschaft zu Heidelberg*, 1887, S. 116.

BECKER, *Atlas der pathologischen Topographie des Auges III.*, S. 94.

NUËL, "De certains troubles cornéens consécutifs à l'extraction de la cataracte," *Bulletins et mémoires de la Société française d'ophtalmologie*, 1892, S. 37.

NUËL, *Archives d'ophtalmologie*, 1883, S. 253.

HESS, "Klinische und experimentelle Studie über die Entstehung der streifenförmigen Hornhauttrübung nach der Staarextraction," *Archiv für Ophthalmologie*, Bd. xxxviii., 4, S. 1.

MÜLLER, "Experimentelle Untersuchungen über die Entstehung der streifenförmigen Hornhauttrübungen nach Staarextraction, *Inaugural-Dissertation*, Greifswald, 1893.

SCHIRMER, "Ueber Faltungstrübungen der Hornhaut," *Arch. f. Ophth.*, xlii., 3, S. 1.

XIX.—NOTES ON CHANGES IN NEUROGLIA CELLS IN INFLAMED AND DEGENERATED OPTIC NERVES.

BY DR. RICHARD GREEFF, BERLIN.

Examinations of pathological changes in neuroglia cells by the Golgi-Cajal method will always be somewhat incomplete, because we obtain no exact information concerning the topography and the extent of the changes. It is often a matter of chance, in fact, how many cells are stained. I have, however, for some years found constant changes in the neuroglia cells in various forms of disease of the optic nerve, a preliminary report of which will be of interest.

The difference between the olfactory and optic nerves and the other cranial nerves is made especially clear by the method of staining neuroglia. In the other nerves a few neuroglia cells are found in the roots, while in the first and second nerves they may be traced to the end of the nerves. Their normal appearance has been described in a previous paper.¹

In cases of ascending interstitial neuritis and perineuritis in which a portion of the optic nerve was resected because of threatened sympathetic ophthalmia, the Golgi method

¹ Greeff, "Die Spinnenzellen im Schnerv und in der Retina," *Archiv f. Augenheilk.*, Bd. xxix., S. 324.

showed the neuroglia cells to have undergone marked changes.

The cell-body is always swollen, more in acute than in chronic cases. Sometimes it is remarkably increased in size and quite irregular in shape and position. Some of the processes, especially the shorter ones, are much thickened, and some appear flattened like broad bands. All of the processes have become varicose, angular, and tortuous. With the thickened processes are others which are very long and fine, also bent and twisted, less varicose, but often having a swelling at their extremity. The more intense the inflammation has been, the more marked are the changes in cell-body and processes. Such changes are found in inflammatory processes in brain and spinal cord, in progressive paralysis, sclerosis, etc.

An entirely different picture is found in simple atrophy of the optic nerve. This condition was produced in young pigeons and rabbits according to Gudden's method by means of evisceration of the eye, leaving the sclera and the sheaths of the nerve intact. This method does not produce a simple atrophy of the fibres of the optic nerve however, as a few days after the operation, there is fibrinous exudation in the subvaginal lymph spaces and moderate inflammation in the trunk of the nerve. In animals killed four months later, atrophy of the nerve is complete. In these cases there is a great increase in the processes of the neuroglia cells, they are not thick and ribbon-shaped as in inflammation of the nerve but enormously increased in number, the new fibres appearing shorter than the normal. The cell-body is not swollen.

Thus the statement, that wherever nerve tissue perishes neuroglia is developed, is established.

A transition between the coarse-fibred proliferation in interstitial neuritis and the finer development in simple atrophy is shown in a case of inflammatory atrophy following neuritis.

XX.—THE ETIOLOGY OF PSEUDO-MEMBRANOUS CONJUNCTIVITIS.

BY DR. **FRITZ SCHANZ**, DRESDEN.

Four cases of pseudo-membranous conjunctivitis are described in which a bacillus was found which corresponded entirely to the Klebs-Löffler bacillus except that it was harmless to guinea-pigs. The question is raised whether this organism is identical with the diphtheria bacillus or whether it is the xerosis bacillus which is said to be more like the Klebs-Löffler bacillus than is the pseudo-diphtheria bacillus.

Uhthoff, also Roux and Yersin, describe an attenuated form of the diphtheria bacillus found in mild cases and at the end of the disease. The identity of this form with the xerosis bacillus would separate it from the family of the Klebs-Löffler as the former occurs in totally different conditions.

It should be shown whether the environment does not induce the virulence. Fibrin is an admirable soil and such favorable conditions might bring it about that the bacillus would become virulent for guinea-pigs. Under these conditions, however, it could not produce the membrane nor could it be regarded as the cause of diphtheria.

We find in pseudo-membranous conjunctivitis, a disease which for years has not been considered as diphtheria, the Löffler bacillus, and in addition, an exactly similar bacillus, which however is not virulent. The relation between these two bacteria is not yet clear.

XXVII.—THE TRANSPLANTATION OF BRIDGE-SHAPED CONJUNCTIVAL FLAPS FOR THE PROTECTION OF LARGE CORNEAL DEFECTS WITH PROLAPSE OF THE IRIS.

BY PROF. **LEOPOLD WEISS**, HEIDELBERG.

I wish to report the success attending the use of a method intended to prevent the development of staphyloma in cases of extensive corneal destruction with prolapse of the iris. The method has been tried only in a few cases as

yet, and only where the ordinary procedure had been unavailing and staphyloma seemed inevitable. A description of different cases will best introduce a discussion of this method.

CASE 1.—Auguste B., æt. six, had a large ulcer involving the greater part of the lower half of the cornea. The ulcer had perforated, the iris with the pupillary margin is prolapsed and ballooned forward. The anterior chamber is abolished. The margins of the ulcer are purulent.

Ordinary treatment being ineffectual to check the progress of the ulcer and beginning staphyloma, I decided to cover the large defect by transplanting a bridge-shaped flap of conjunctiva as shown in the cut. First the flap was marked out with a sclerotome,

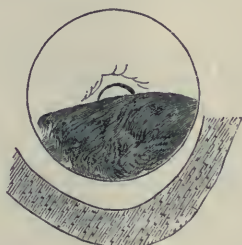


FIG. 1.

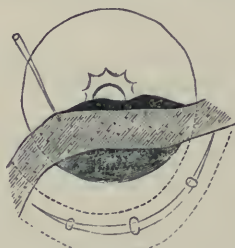


FIG. 2.

then the conjunctiva with the subconjunctival tissue dissected off. The flap was then drawn upward and laid over the prolapsed iris. To fix the flap in place a suture was passed provisionally, from the nasal side upwards, and attached just above the cornea, as shown in Fig. 2. Finally the wound left by the removal of the flap was closed loosely with three sutures. Iodoform was dusted on the eye and both eyes bandaged.

The result was unexpectedly good. The flap remained in place, and in two days the anterior chamber was re-established; the ulcer made no further progress, its floor cleared up, and considerable repair of the cornea took place, especially in the lower, inner portion, where a small margin of cornea had remained. The transplanted flap, instead of being infiltrated with pus from the ulcer, seemed by the contact of its healthy vascular tissue to influence healing by offering an unfavorable condition for the further development of bacteria. The protruding prolapse flattened under the flap, and the perforation was quickly closed, as

the anterior chamber began to fill on the next day. The result was permanent, and in course of time the cornea became clearer, so that a year after the operation V was $\frac{6}{10}$ and the appearance as shown in Fig. 3. The cosmetic result was not satisfactory, as the

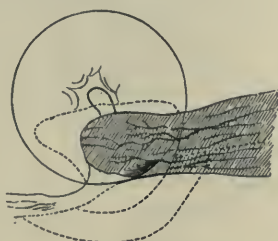


FIG. 3.

vascular band lay like a pterygium across the cornea, especially to the temporal side where it was firmly adherent to the tissue beneath. The vascularization was much diminished by two vertical incisions and sutures.

CASE 2.—August L., æt. nine. R. E. Rather more than half the cornea was involved, the entire lower portion being occupied by a purulent ulcer which had perforated in the lower, outer quadrant. Above the margin of the ulcer, in the clear cornea, small infiltrations were to be seen in the deeper layers. In the anterior chamber was a large exudation. The ulcer had been noticed only a few days before, and had probably followed infection from a furuncle on the forehead.

Because of its very rapid progress the prognosis was most unfavorable.

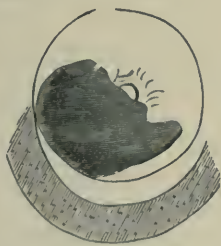


FIG. 4.

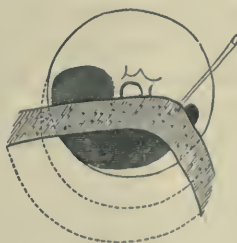


FIG. 5.

The operation was performed as already described (Figs. 4 and 5). On the following day, slight œdema of the lids, moderate secretion. On the second day there was much secretion and swelling; a quantity of thin, sero-purulent fluid, as in "pseudo-

blennorrhœa" in girls with vaginal discharge, flowed from between the swollen lids. In a similar case with croupous membrane on the conjunctiva, staphylacoccus pyogenes aureus was found. Frequent changes of dressing, antiseptics, and especially weak solutions of acetate of aluminium improved the condition and on the fifth day the ulcer appeared nearly clean, the anterior chamber filled, and the transplanted flap healed on the temporal side; in the middle it had broken down and the remainder had retracted toward its base. Later, the eye became nearly free from irritation and painless. The iris and lower pupillary margin formed part of the cicatrix. A broad, vascular band passed like a pterygium from the temporal side to the centre of the cornea, under the edge of which, at the limbus, a sound may be passed. $V = \frac{6}{15}$.

CASE 3.—In this case there was a partial, conical staphyloma of the cornea, for which iridectomy was performed followed by abscission of the staphyloma with transplantation of a flap of conjunctiva.

Minna O. æt. six. The right eye had recently suffered from a severe inflammation which led to the rapid development of a staphyloma which protruded between the lids.

The entire lower half of the cornea was occupied by a conical protrusion with a broad round base; above this the anterior chamber was seen to be shallow and the edge of the pupil visible. At the base of the staphyloma was a broad opacity and its apex was flattened and vascular. After iridectomy and abscission the protrusion returned; this was again removed, the lens extracted, the lips of the wound united by three catgut sutures, and over this a bridge-shaped flap was brought and fastened by two provisional sutures upwards. The result was satisfactory, the cicatrix firm and flat, and there has been as yet no sign of a recurrence.

This case seems of importance because frequently an ectatic cicatrix, in spite of excision, cauterization, iridectomy, etc., returns with increased tension until the eye is lost.¹

¹ E. Fuchs, "Ueber Keratoplastik." *Verhandl. d. Ges. deutsch. Naturforscher und Aerzte*, Wien, 1894, S. 211.

In Case 4 also, where almost the entire cornea was destroyed and the iris prolapsed, transplantation led to a flat cicatrix; but the case has not been observed long enough to be certain whether the result is permanent.

As in this case, if only a portion of the prolapse is covered with conjunctiva, the nutrition seems to be so much improved that better conditions are obtained for regeneration.

Alex. Pagenstecher seems to have been the first, about thirty-six years ago, to use flaps of conjunctiva in the treatment of ulcers of the cornea. In 1876 Schöler defined the indications for the method as follows:

1. In all large and threatening ulcerations.
 - a. Where perforation is imminent.
 - b. Where perforation has taken place.
 - α. Without prolapse of the iris.
 - β. With prolapse. The presence of secretion makes the operation more urgent, after disinfection of the ulcer.
2. In open wounds of the cornea with or without prolapse of the iris.
3. In corneal fistulæ, after freshening the edges of the fistula.
4. In partial, stationary staphyloma.
5. In total staphyloma.
6. In perforating scleral wounds and ulcers.
7. In cystoid cicatrix.

In the operation preferred by Schöler, the epithelial side of the flap was in contact with the cornea, and, in consequence, adhesion often was not obtained and the conjunctival flap shrunk.

Kuhnt later applied the operation to peripheral ulcers and wounds of the cornea, especially to lessen the danger, often postponed for years, following incarcerations of the iris.

Kuhnt at the Ophthalmological Congress at Heidelberg, in 1885, and da Gama Pinto¹ recommended the use of pieces of conjunctiva without pedicles.

E. Meyer, Swanzy, Leber, and others have expressed the opinion that the presence of iris tissue in corneal wounds

¹ *Klin. Monatsbl. f. Augenh.*, 1887, 25 Bd., S. 1.

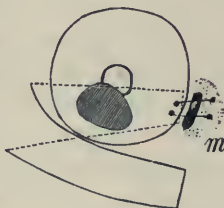
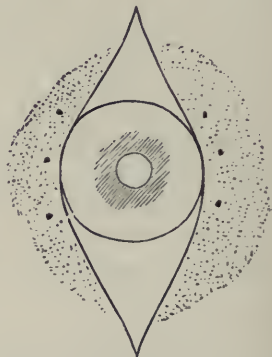
opens a door to later infection and is a constant danger to the eye; while v. Zehender attributes the resulting inflammations of the uveal tract to traction on the iris, and makes a small iridectomy near or opposite to the prolapse.

According to the present state of the question, that purulent irido-cyclitis in old cases of peripheral, anterior synchiae is a result of infection through the cicatrix, it is rational to cover the cicatrix with conjunctiva, in order to lessen the danger of infection.

Ed. Meyer makes use of conjunctival transplantation in incarceration of the iris and in such corneal or scleral scars as have ectatic edges which would be likely to admit infection. The methods used by him, according to the case, are as follows¹:

1. When a cicatrix lies in the conjunctival region, he excises the latter over the scar, loosens it on one side so that it can be drawn across without difficulty, and sutures it on the other side of the cicatrix. (Fig. 10, *a*.)

2. If there is a cicatrix in the cornea, he forms a conjunctival flap parallel to the corneal margin nearest the scar, draws it over the scar, and sutures it to the sclera opposite, having removed the conjunctiva at this point. (Fig. 10, *b*.)

FIG. 10, *a*.FIG. 10, *b*.FIG. 10, *c*.

3. In extensive ulcerating cicatrices of the cornea, the conjunctiva on the nasal and temporal side, throughout its periphery, is loosened as far back as the equator and drawn

¹ Communicated by letter.

over the cornea and sewed together. To avoid folds, a wedge-shaped piece of conjunctiva is excised above and below. It is as easy to loosen the conjunctiva above and below and sew it horizontally over the cornea. (Fig. 10, *c*.)

In all these operations, ectatic scars are first levelled with the thermo-cautery.

XXIX.—THE PROPHYLAXIS OF SYMPATHETIC OPHTHALMIA.

BY DR. GEORGE ABELSDORFF, BERLIN.

For the prevention of sympathetic inflammation, three operations are available, namely, enucleation, evisceration, and resection of the optic nerve. None of these is infallible since the chief condition, a sufficiently early intervention, is often lacking. Three and possibly four cases are mentioned, reported by Dransart, Cross, and Waldispühl, in which sympathetic ophthalmia followed evisceration.

In the present case, evisceration and resection of the nerve, performed four weeks after the traumatism, were both unavailing to prevent the onset of sympathetic ophthalmia, which appeared in the left eye of a child seven weeks after a wound of the right cornea by a piece of glass. The eye had remained inflamed and painful, and vision was lost. There was extreme circumcorneal injection, and a staphyломatous cicatrix of the cornea. The wound did not extend beyond the limbus. A foreign body was not found in the eye.

Three weeks after the combined evisceration and resection, the left eye was attacked by severe irido-cyclitis, for which treatment was unavailing.

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE FIRST
QUARTER OF THE YEAR 1899.

By DR. ST. BERNHEIMER, IN VIENNA ; DR. O. BRECHT,
PROF. R. GREEFF, PROF. C. HORSTMANN, AND PROF.
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WITH THE ASSISTANCE OF

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Stockholm ; Dr. HERRNHEISER, Prague ; Prof. HIRSCHMANN, Char-
kow ; Dr. KRAHNSTÖVER, Rome ; Dr. P. VON MITTELSTÄDT,
Metz ; Prof. DA GAMA PINTO, Lisbon ; Dr. RICH-
ARD SCHWEIGGER, Berlin ; Dr. SULZER,
Paris ; Dr. L. WERNER, Dublin ;
DR. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

(Continued from page 468.)

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

739. KOSTER. A case of zona ophtalmique with interstitial keratitis without epithelial lesions. *Ann. d'ocul.*, cxxi., p. 96.

740. TERSON. Two cases of parenchymatous keratitis in acquired syphilis, with presentation of patients. *Ibid.*, p. 43.

741. PETIT. On a particular form of corneal infection of serpiginous type. *Ibid.*, p. 166.

742. ZINN. On the treatment of hypopyon keratitis. *Wiener klin. Wochenschr.*, 1899, No. 9.

743. UHLENHUTH. A case of lepra tuberosa with a beginning

leprous affection of the cornea (keratitis superficialis punctata). *Charité Annalen*. xxiii.

744. TROUSSEAU. Tattooing the cornea and sympathetic ophthalmia. *Ann. d'ocul.*, cxxvii., p. 185.

745. VALUDE. An episcleral fibro-cartilaginous plaque. *Ann. d'ocul.*, cxxi, p. 118.

746. HENNICKE. The extraction of a mass of conglomerate containing a splinter of iron from the anterior chamber. *Zehender's klin. Monatsbl.*, xxxvii., p. 29.

747. ELLETT. A series of cases of malarial keratitis with a report of the blood examination. *Ophth. Record*, March, 1899.

748. LEDBETTER. Keratitis herpetica. *Am. Journ. of Ophth.*, March, 1899.

749. BRUNS. A case of xerosis of the cornea, hemeralopia, and bleeding from the gums. *Ibid.*

750. STIEREN. (Edematous changes in the epithelium of the cornea in a case of uveitis following gonorrhœal ophthalmia. *Johns Hopkins Hospital Bull.*, Dec., 1898.

751. MUNCASTER. Hernia of the sclerotic. *Ophth. Record*, Jan., 1899.

752. GIFFORD. Ulcus rodens corneæ. *Zehender's klin. Monatsbl.*, xxxvii., p. 77.

Serpent ulcer of the cornea is now commonly and rightly believed to be due to pneumococcus infection. PETIT (741), a pupil of Morax's, has observed a number of cases of serpent ulcer which were distinguished clinically by absence of pain in spite of the hypopyon, and by the absence of posterior synechiæ. Most of the patients suffered from stenosis of the lachrymal duct. The pus from these ulcers contained great numbers of diplobacilli ($2\ \mu$ long and $1-1.5\ \mu$ thick). In bouillon cultures they assumed the shape of diplococci. The microorganism is not pathogenic for animals, and does not retain the stain by Gram's method. It grows on the ordinary culture media, and fluidifies gelatine. Its vitality is greater than that of the Morax diplobacillus, and it can live for days in a temperature of $15^{\circ}-20^{\circ}\text{C}$.

ZINN (742) cauterizes at once every serpent ulcer complicated with hypopyon; the anterior chamber may be punctured peripherically with a lance knife, and then only mild means of treatment are employed. Sæmisch's operation is rejected on account of its consequences. Subconjunctival injections of salt solution are

not of sufficient benefit to make up for the pain they cause. The contents of the tear sac should be expressed rather than syringed out, or the sac may be incised or extirpated.

In UHLENHUTH'S (743) patient, who had suffered for twelve years with leprosy, the left eye had for nine months presented a central corneal opacity, representing a tuberculous form of lepra. It consisted of large nodules and fine points which were arranged in concentric arcs at the corneal margin. The epithelium above them was present. The vessels about the cornea were but slightly enlarged and there were no new vessels in the cornea. Nodules were present in the lids, and the eyebrows and lashes were wanting.

TROUSSEAU (744) records a number of cases which show that tattooing of the cornea may cause an outbreak of iridocyclitis and sympathetic ophthalmia. If anterior synechiæ exist this is easy to explain, but Trousseau had seen this unfavorable result even after tattooing simple leucomas.

SULZER.

VALUDE (745) extirpated a small episcleral tumor from the equatorial region between the superior and the external rectus in a boy of eight. The tumor was adherent by a pedicle to a depression in the sclera. It was congenital, but had recently increased in size. It consisted of fibro-cartilage.

SULZER.

HENNICKE (746) was able with a magnet to remove from the anterior chamber a small splinter of iron adherent to a mass of stone. In the beginning this had become negatively magnetic and eluded the forceps.

ELLETT (747) reports nine cases of keratitis of the dendritic variety associated in every instance with malaria, as determined by the blood examinations. The tertian or quartan forms were the most common. The patients were both white and negro, and only one eye was affected in each case. No organisms were found in the material scraped from the furrows in the cornea.

BURNETT.

LEDBETTER (748) gives the histories of three cases of seemingly typical keratitis dendritica in men who though strong were run down. None had had malarial poisoning in any form.

BURNETT.

The point of interest in this case of BRUNS'S (749) is that the eye symptoms of conjunctival xerosis and night-blindness were due to a scorbutic condition, the patient having lived principally on salted bacon and Irish potatoes. Improved nourishment proved a cure.

BURNETT.

The specimen described by STIEREN (750) was an eye that had been lost from gonorrhœal ophthalmia in which a perforation of the cornea and prolapse of the iris had occurred. The corneal epithelium showed the kind of vacuoles which have been observed in glaucoma. They were caused in this instance, the author thinks, by the closure of the lymph channels and retention of the lymph in the lymph spaces of the cornea. There was also, in all probability, an increase in the quantity of the lymph, brought about by the undue determination of blood. BURNETT.

MUNCASTER (751) reports a case of staphyloma of the sclera, evidently due to an attempt to remove an opaque lens which was seen floating in the vitreous. An iridectomy had been made. The bulging sclera, which was very thin, was 4 mm above the level of the surface and 4 mm in diameter at its base. BURNETT.

GIFFORD (752) treated in the usual way a rodent ulcer of the cornea following traumatism, without result, until he extirpated the conjunctiva, which had become undermined in nearly the entire circumference of the cornea, after which the process ceased to advance.

Sections XIII.—XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

753. DE OBARRIO. On congenital cataract in a rabbit. *Centralbl. f. prakt. Augenheilk.*, xxiii.

754. KUHNT. On operations for secondary cataract. *Zeitschr. f. Augenheilk.*, i., pp. 151 and 260.

755. NUEL. Etiology and pathology of anterior polar cataract. *Arch. d'opht.*, xix., 1, p. 6.

756. WESTHOFF. A case of congenital bilateral luxation of the lens. *Med. Weekblad*, 1899, March 25.

757. TERSON. On extraction of cataract in keratoconus. *Arch. d'opht.*, xix., 2, p. 125.

758. TERSON. A precise indication for the extraction of soft cataract by means of aspiration. *Ann. d'ocul.*, cxxi., p. 161.

759. VALUDE. Expulsive hemorrhage after extraction of cataract. Reclination of the lens in the other eye. *Ann. d'ocul.*, cxxi., p. 33.

760. DADDI. Observations on post-mortem cataract in kittens. *Annali di Ottalm.*, xxvii., 4.

761. BIETTI. Modifications of structure in a luxated but still transparent lens. *Ibid.*

762. ADDARIO. On an anomaly of conformation of the lens, with a contribution to the development of the eye in the vertebrates. *Arch. di Ottalm.*, v., p. 51.

763. ANGELUCCI. A modification of the process of simple extraction. *Ibid.*, p 71.

764. KUHN. Successful treatment of corneal suppuration (pneumococcus infection) after extraction. *Zeitschr. f. Augenheilk.*, i., 1, p. 52.

765. WETTENDORFER. Further cases of juvenile total cataract due to tetanus, with a contribution to the histology and histochemistry of cataract. *Beiträge zur Augenheilk.*, xxxviii.

766. FRYER. Profuse hemorrhage subsequent to the extraction of senile cataract. *Amer. Journ. of Ophthal.*, Feb., 1899.

767. ALT. On the pathology of cataract, especially in its earliest stages. *Ibid.*

768. BRUNS. Two cases of discission of lens in high myopia. *Ibid.*, March, 1899.

769. MARLOW. Spontaneous absorption of senile cataract with restoration of vision. *N. Y. Med. Journ.*, Jan. 14, 1899.

DE OBARRIO (753) found accidentally in a rabbit an opacity of the lens. There was a limited zone of opacity in the cortex and a second in the otherwise clear nucleus.

KUHN (754) gives in detail his views on secondary operations, of which he has done 709 in fourteen years. He prefers discission with one or two small knives.

NUEL (755) believes that the ordinary anterior polar cataract is not congenital, but mostly a result of blennorrhœa. Nuel examines all of his cases of blennorrhœa in the beginning to determine the presence or absence of polar cataract. In two cases in which there was corneal ulcer without perforation anterior polar cataract developed. He assumes that the phlogogenic matters pass from the cornea into the anterior chamber and excite the anterior capsular epithelium to proliferation. A similar process is not observed in adults because the capsular epithelium possesses less excitability, although even here when a perforation exists for some time, or there is hypopyon, cataract may develop.

V. MITTELSTÄDT.

WESTHOFF (756) observed a bilateral luxation of the lens down-

ward and inward in an otherwise normal boy of nine. When the head was held straight vision was very poor, and he required +12 D for distance and +16 for near. By bending his head forward and to the side, the rays of light then passing through the margin of the lens, he was able to read without glasses when the print was held very close.

The removal of soft cataract by aspiration has given good results in the hands of Belgian oculists (Coppez, Redard, Rogman and others). TERSON (758) by this method removed with ease a luxated traumatic cataract in a boy of seventeen. He avoided in this way the danger of forcing the lens back into the vitreous in the attempt at extraction. With a lance knife he made a corneal incision 6 *mm* long and divided the capsule with a cystitome. The canula of an Anel syringe was then introduced through these two wounds and after a slow aspirating movement the pupil suddenly became black.

SULZER.

In a patient in whom extraction led to profuse intraocular hemorrhage, VALUDE (759) performed reclinacion on the other eye. The result was excellent. The author asks whether this simple and easily performed operation really deserves its bad reputation, and whether it is not frequently indicated. In order to avoid rupture of the capsule Valude passes a blunt curette through the scleral incision, and with this forces the lens downward.

SULZER.

The observations and experiments which form the basis of DADDI'S (760) paper concern the temporary opacity of the centre of the lens which comes on after death in kittens. These opacities, which can be produced and then be made to disappear by warming and cooling the lens, do not depend, according to the author, on changes in the watery components of the lens. He believes that the amount of water in the lens gradually decreases with age, and that in the kitten's lens certain temperatures cause a precipitation of albuminous matters which at other temperatures redissolve.

KRAHNSTÖVER.

BIETTI (761) reports the microscopic examination of a lens which was dislocated backward a month before but still remained transparent. He finds that the first changes occur in the cortex as in all soft and quickly developing forms of cataract.

KRAHNSTÖVER.

In cataract extraction ANGELUCCI (763) uses no speculum, but grasps the conjunctiva and the underlying tendon of the superior

rectus with a broad fixing forceps. This forceps holds back the upper lid and serves to fix the eye. The capsule is opened with the knife between puncture and counter-puncture.

A similar operation, though one more radical in its simplicity, is done by Trousseau, who merely retracts the lids with the thumb and index finger of one hand, and performs the entire operation with the linear knife alone. KRAHNSTÖVER.

KUHNT (764) extracted a cataract from an eye ten weeks after removal of the tear sac for chronic suppuration. At the first dressing, four days after operation, the eye appeared somewhat irritated, and four days later there was iridocyclitis with suppuration of the corneal wound and hypopyon. A large infiltrated flap of cornea was excised, and the defect covered with conjunctival flaps. Smooth healing occurred, with good vision. The author prefers his procedure to that of destroying the affected part with the galvano-cautery.

FRYER'S (766) case was a woman of seventy-four years, in whom there developed a glaucoma of the right eye, for which an iridectomy was done, after which the symptoms subsided. A cataract developed, and a year after the iridectomy an extraction was made. The patient was quiet, and the lens was delivered easily. No collapse of cornea; wound edges well adapted; no loss of vitreous. Four hours after the operation a profuse hemorrhage took place, and the eye became atrophied. The other eye was already lost and atrophied from causes that could not be learned.

BURNETT.

As a result of the examination and study of a large number of cataracts histologically, and of which a number of illustrations are given from photographs of the specimens, ALT (767) concludes that the formation of a cataract is somewhat as follows: First, there is a sclerosis of the nucleus causing fissures between the lens fibres. Then follows an imbibition of the lens fibres with fluids from without, aiding in the destruction of these fibres, especially at the equatorial terminus of the seams. Then comes the formation of chemical substances which act as irritants on the younger fibres and capsular epithelium. We have then a formation of spindle-shaped swellings in the lens fibres, and of the vesicular cells in the epithelial layer, especially near the equator, probably caused by the imbibition of fluid from the outside. Further imbibition may lead to the formation of large cavities, or even the Morgagnian form of almost complete fluidity. There

may be other products of regressive metamorphosis, such as deposits of lime, crystals of fatty acids, cholesterin, etc.

BURNETT.

In the first of BRUNS's (768) cases the M in the R. eye was -16 and with this $V = \frac{2}{3}$. After discission and taking away the opaque capsule with $+3$ 105° $V = \frac{2}{3}$. In the second case R with -16 $\bigcirc - 2$ 165° $\frac{2}{3}$; L -16 $\bigcirc - 2$ 180° $\frac{2}{3}$. After absorption, R $V = \frac{2}{3}$ without a glass; L $\frac{2}{3}$.

BURNETT.

MARLOW (769) reports a case of hypermature cataract in which the zonula and capsule were apparently ruptured, causing a dislocation of the nucleus and capsule into the anterior chamber. With $+10$ $V = \frac{6}{36}$. The patient was about eighty years of age.

BURNETT.

XV.—CHOROID.

770. LEVINSOHN. On sclerosis of the choroid with secondary degeneration of the retina. *Arch. f. Augenheilk.*, xxxviii., p. 268,

771. HANKE. On intraocular tumors. *Graefe's Archiv*, xlvii., p. 463.

772. JARNOTOWSKI. A contribution to iridocyclitis or phthisis bulbi in cases of sarcoma of the choroid. *Arch. f. Augenheilk.*, xxxviii., p. 382.

773. WAGENMANN. A case of specific choroiditis disseminata combined with retinitis hemorrhagica in the same eye. *Ophth. Klinik*, 1899, No. 2.

774. CHEVALLEREAU. Sarcoma of the choroid. *Ann. d'ocul.*, cxxi., p. 203.

LEVINSOHN (770) describes a case of pronounced sclerosis of the choroidal vessels, without sclerosis of other vessels, but accompanied by atrophy of the retina. The patient was a man of sixty, who was otherwise healthy and had never been seriously ill. For seven years he had complained of failing vision and hemeralopia. R $V = \frac{3}{10}$; L $V = \frac{4}{15}$. Visual fields contracted on all sides to 10° , while a narrow strip in the periphery was here and there preserved. Colors were recognized only in the centre. Pupillary reaction was sluggish and there were senile changes at the æquator of the lens. Fine opacities were seen in the posterior segment of the vitreous. The discs were pale, the arteries much contracted, the veins slightly contracted. About the discs were several large yellowish-white patches, but the maculas were free. The chori-

dal vessels were visible as white stripes which were partly empty, and in part enclosed a thin column of blood. In the periphery were several small foci of choroiditis. The retinal pigment was heaped up in little masses here and there. The author considers the process to be a senile sclerosis of the choroidal vessels without inflammatory changes, that had its beginning in the ciliary arteries. The clinical picture resembles but is not identical with the *atrophia gyrata chorioideæ et retinae* of Fuchs.

HANKE (771) describes three intraocular tumors. The first case was one of pigmented tumor of the chamber angle arising from the endothelium of the ligamentum pectinatum in an eye blind from primary glaucoma.

The second case was one of tumor in the ciliary body arising from the unpigmented pars ciliaris retinae of the ciliary processes, and projecting into the vitreous. This tumor was composed only of cells and large communicating cavities, containing no connective-tissue stroma. The author did not consider it to be either an epithelioma or an adenoma.

The third case occurred in a boy of sixteen. A mixed-celled melano-sarcoma of the choroid perforated the ball at the limbus corneæ without being accompanied with symptoms of glaucoma. In the region of the tumor the choroid showed signs of previous inflammation and the retina was atrophic. The author believes that there was first an inflammation ending in cicatrization from which the tumor arose.

JARNOTOWSKI (772) reports two cases of sarcoma of the choroid. In one case there were pronounced iridocyclitis, hypotony, and moderate shrinking of the ball in a woman of fifty-five, who had noticed failure of vision and severe inflammatory symptoms for two years and a half. The soft, completely blind eye was enucleated on account of the pain. The ball was found to contain a pigmented, partly alveolar tumor which nearly filled the vitreous chamber and was so necrotic that the nature of its component cells could not be determined. The uveal tract and the retina were atrophic and showed signs of previous plastic inflammation. No microorganisms were found, and the author, therefore, attributes the necrosis to the cyclitis, according to the view held by Leber, Krahnstöver, and Evetzky.

The second case was in a man of fifty-two, who had noticed a diminution of vision since the spring of 1894, and had suffered an injury in the region of the eye in the summer of 1894. In

August, 1898, the painful, phthisical eye was enucleated. A mixed-celled melano-sarcoma was found in the eye, with evidences of plastic iridocyclitis. In this case also the author thought the sarcoma to be the primary affection, and the phthisis secondary.

WAGENMANN'S (773) patient had, four years previously, an attack of specific disseminate choroiditis which seriously injured vision, but passed off completely under specific treatment. At the present time an ordinary disseminate choroiditis has appeared in the right eye which had not been previously affected, and in the left eye, besides fresh choroidal patches below the disc, there is an extensive peripheric hemorrhagic retinitis in the upper outer quadrant of the fundus. The author believes the cause to have been syphilitic alterations in the walls of the retinal vessels which were seen to be bordered by white lines.

XVI.—VITREOUS.

775. CHODIN. An unusual case of thread-shaped structure in the vitreous (remains of hyaloid artery?) *Wjest. Ophth.*, 1899, No. 2.

776. KASSODUBOSKY. A case of membranous formation in the vitreous. *Ibid.*

In CHODIN'S (775) case the anterior, thicker end of the thread was attached to the lens while the thinner, posterior end was freely movable in the vitreous. The eye was myopic. The author believed the thread to be the remains of a hyaloid artery which had been torn through in the development of the myopic sclerectasia.

HIRSCHMANN.

KASSODUBOSKY (776) observed a case of typical disseminate chorio-retinitis that was probably congenital. The disc and the surrounding portion of the fundus were covered with a membranous formation which was elevated more than 2 mm above the level of the retina. According to the patient's statement the eye had always had poor vision, which grew worse after a severe intoxication (probably from phosphorus). The author believes that the phosphorus poisoning led to extravasations, and to connective-tissue proliferation, and he regards these new membranes not as constituting Manz's *retinitis proliferans*, but rather as representing Leber's *papillo-retinitis interstitialis hemorrhagica hyperplastica*.

HIRSCHMANN.

XVII.—GLAUCOMA.

777. FRIEDRICH. On the results of the operative treatment of chronic glaucoma. *Inaug. dissert.*, Giessen, 1898.

778. LAQUER. Remarks on the nature of inflammatory glaucoma. *Graefe's Archiv*, xlvii., p. 631.

779. NATANSON. On glaucoma with retinitis pigmentosa and myopia. *Wratsch*, xv., 6, p. 109.

780. DEMISCHERI. Sympathectomy in cases of glaucoma. *Ann. d'ocul.*, cxxv., p. 188.

781. ABADIE. Nature and treatment of glaucoma. *Arch. d'ophth.*, xix., 2, p. 94.

782. DOLGANOFF. On the pathological anatomy of glaucoma (a clinico-histological study). *Wratsch*, 1899, No. 3.

FRIEDRICH (777) reports on 150 glaucomatous eyes seen in Giessen in the years 1879-1898. The treatment consisted in iridectomy, sclerotomy, and the use of medicamentous remedies. The author concludes that non-operative remedies invariably lead to bad results, and that iridectomy is the most efficacious of the operations. When it alone is not sufficient, its effect may be supplemented by sclerotomy.

Since the present theories as to inflammatory glaucoma are not altogether satisfactory, LAQUER (778) offers the explanation that there are particular nerves which have the exclusive function of regulating the size of the vessels, thus controlling secretion. It is not known in what nerve tracts these fibres are contained, we only know that they are not in the trigeminus.

ABADIE (781) seeks to refute the arguments offered in opposition to his theory that glaucoma arises through excitation of the sympathetic vaso-motor nerves. Even the older experiments of Hippel and Grünhagen showed that an intracranial excitation of the trigeminus (with simultaneous excitation of the accompanying sympathetic fibres) would produce increased tension lasting as long as the excitation continued. In all forms of acute, subacute, or intermittent glaucoma there is an excitation of the vessel-dilating fibres which arise in the medulla and run in the trigeminus, and iridectomy in such cases acts only by dividing these nerve fibres which are causing the increased tension. Excitation of the second, third, and fourth spinal roots of the sympathetic after section of the trunk of the sympathetic on the same side produces a redness of the face on the opposite side. On the strength of

this experiment Abadie would explain in the same way the onset of glaucoma in the healthy eye after iridectomy on the diseased eye. He supposes that in the operation of iridectomy the sympathetic vessel-dilating fibres are torn and injured, and the excitation is conveyed to the corresponding fibres for the other eye and there causes increased tension. In glaucoma simplex, iridectomy is of no avail since the excitation of the vessel-dilating fibres occurs in the cervical sympathetic and its fibres running to the ciliary ganglion. Therefore, Abadie has proposed in these cases the resection of the upper cervical ganglion or the division of its branches. In one patient operated upon in this manner the tension became normal and the vision improved. Although usually the pupil becomes contracted after this operation, in this case of glaucoma the pupil remained of medium size and reacted to light.

V. MITTELSTÄDT.

DOLGANOFF (782) reports the case of a boy of eleven in whom discission had been done twice for soft cataract. The result as regarded vision was unsatisfactory. Two months later oblique illumination revealed a vascular tumor close behind the ciliary body. The tumor grew and the tension of the eye became increased. After enucleation the tumor was submitted to microscopic examination and proved to consist merely of detached retina. In the ciliary body he found a cellular infiltration and inflammatory products of long standing, with absorption of pigment from its normal position and its heaping up in clumps. In the iris he found perivasculitis and ectropium iridis; the periphery of the iris was closely united with the periphery of Descemet's membrane. Fontana's spaces were occluded and Schlemm's canal partially obliterated. The totally detached retina had undergone a connective-tissue degeneration with the formation of cysts and the obliteration of the vessels.

The author regards the iridocyclitis with the adhesions and blocking of the chamber angle as the starting point of the glaucoma.

HIRSCHMANN.

XVIII.—SYMPATHETIC OPHTHALMIA.

783. SCHIRMER. On the pathogenesis of sympathetic ophthalmia. *Centralbl. f. pr. Augenheilk.*, xxiii., p. 40.

SCHIRMER'S (783) paper is a polemic against Moll, in which he maintains that sympathetic ophthalmia is of bacterial nature although it is not known whether the microorganisms reach the second eye through the blood-vessels or through the lymphatics.

Sections XIX.—XXII. Reviewed by PROF. GREEFF, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

784. REIMAR. On retinitis hemorrhagica in consequence of endarteritis proliferans, with the microscopic examination of a case. *Arch. f. Augenheilk.*, xxxviii., p. 209.

785. REIMAR. The so-called embolism of the central artery of the retina and its branches. *Ibid.*, p. 291.

786. LEVIN. On a case of abnormal tortuosity of the retinal vessels. *Ibid.*, p. 257.

787. FISCHER. The operation for myopia and detachment of the retina. *Centralbl. f. Augenheilk.*, xxiii., p. 74.

788. HILBERT. On a subjective light phenomenon, and its relation to scotoma scintillans or hemicrania. *Ibid.*, p. 77.

789. DE SCHWEINITZ. A note on toxic chromatopsia and toxic hysteria. *Ophth. Record*, Jan., 1899.

790. ERWIN. Acute color blindness. *Ibid.*

791. WOODS. Blindness following the intoxicating use of Jamaica ginger. Report of 6 cases. *Ibid.*, Feb., 1899.

792. FRIDENBERG, PERCY. The detection of simulated monocular blindness. *Ibid.*, Jan. 1899.

793. WÜRDEMANN AND MURRAY. A case of macular retinitis, due to a flash of electric light. *Ibid.*, May, 1899.

794. VEASEY. A clinical study of double choked disc, in a case of quiet otitic thrombosis of the sigmoid sinus without pyæmia. *Ibid.*, June, 1899.

795. WOOD, CASEY A. The ocular evidences of hysteria. *Amer. Journ. Med. Sciences*, Jan., 1899.

796. RYERSON. Lightning stroke causing eye diseases. *Med. Record*, Apr. 22, 1899.

REIMAR (784) made a microscopic examination of an eye in which the ophthalmoscopic diagnosis of thrombosis of the central vein had been made, and glaucoma supervening necessitated enucleation. In the central artery he found a pronounced narrowing of the lumen, from endarteritis proliferans. All the retinal arteries showed arterio-sclerotic changes, ranging from diffuse or crescent-shaped thickenings of the intima, composed of more or less cellular fibrous tissue, to almost complete obliteration of the lumen, from the proliferated tissue. Some branches had been transformed into fibrous cords.

The veins in part were normal, and in part were thickened with sclerosis. They had thrown out new twigs, which were found to terminate in groups of nuclei.

Since the time of von Graefe's report, we know definitely the clinical picture of embolism, but, as is well known, there are other affections which may simulate this clinical picture. According to REIMAR (785) in such cases one must determine whether the blood current has been actually stopped. He believes that as long as the blood column appears to be unbroken, even though thinned from thickening of the vessel wall or obscured by opacity of the vessel wall, and extends to the periphery without a break, circulation still exists; only when the column is broken up and the segments remain still, can one conclude that circulation is completely stopped. With the clinical picture of so-called embolism of the central artery, there are three possible causes of the disturbance in circulation: embolism, thrombosis, and endarteritis proliferans. Reimar states, further, that while the conception of thrombosis or of embolism will allow one to explain many of the symptoms observed, it will not allow one to explain them all; the conception of an endarteritis proliferans of the central artery or its branches, however, fills all the requirements, and this diagnosis is to be made when thickening of the arterial walls can be observed with the ophthalmoscope. In true embolism or thrombosis, which of course occur, we must have complete blindness and granular breaking up of the blood column beyond the obstruction.

LEVIN'S (786) patient was a girl of eighteen who had always seen poorly with her left eye. She had H. 7 D, and the retinal veins and arteries were very tortuous. They ran in corkscrew curves quite to the periphery of the fundus, giving off branches that looped and turned backward. The ophthalmoscopic picture was shown on a lithographic plate. The author regarded the condition as being a congenital anomaly, and this view is strengthened by the existence of hyperopia of 7 D.

FISCHER (787), also, justly objects to the "jubilation that appears even in the illustrated family papers" in regard to the operation for myopia of high degree. The reviewer has already expressed the opinion that as valuable as that operation may be in proper cases, so disastrous are the results of its indiscriminate use. The author discusses in detail post-operative myopia and criticises the papers of Fröhlich and Schröder.

HILBERT (788) has twice observed in his own person a peculiar subjective visual phenomenon not hitherto described. Suddenly and without warning a gleaming yellow zigzag line appeared in the left half of the visual field, having the form of a square open to the right. These lines were seen binocularly, and were purely a hemianopic manifestation; they remained fixed and did not scintillate. The phenomenon is evidently related to scotoma scintillans and to hemicrania.

The interesting features in the case reported by DE SCHWEINITZ (789) are the appearance of what seemed to be amblyopia with marked yellow chromatopsies, central color blindness for red and green, with a total central scotoma in the right eye, due it was thought to the poison of tobacco acting on a system run down by gastro-intestinal catarrh. In the left eye there was apparently a profound amblyopia existing, in the patient's opinion, for many years which was proved to be clearly of hysterical origin. The simulation test revealed vision in that eye as good as in the other. Under abstinence from tobacco the right eye recovered completely in the course of about three months.

BURNETT.

It seems from the report given by ERWIN (790) of his cases of two sisters simultaneously affected with the symptoms of snow blindness, that they were not able to distinguish colors. It is unfortunate that a more accurate and scientific examination of the cases was not made. There were the usual symptoms of snow blindness: photophobia, blepharospasm, and diminished visual acuteness. The fundi are reported as being normal. There was restriction of the visual fields. Recovery of color vision followed the disappearance of the other symptoms.

BURNETT.

WOODS (791) gives the history in great detail of six cases of amblyopia following the use of Jamaica ginger in intoxicating doses. Four of these cases are from his own practice. While there is some variation in the individual cases as to special symptoms, there can be no doubt that the pathological change is a retrobulbar neuritis of the acute variety—and that alcohol is not the sole cause. There is always contraction of the visual fields, and usually a scotoma as well. The disks, sometimes normal-looking during the first days of the attack, always become white later.

BURNETT.

The plan suggested by FRIDENBERG (792) for the detection of simulated monocular blindness, is to hold a small test card in front of the eyes of the subject, with its back to the subject, and

deflect the letters, by means of a large laryngoscopic mirror, into the subject's eyes. By proper management this enlarged virtual image of the letters can be made to fall, at the will of the experimenter, on either retina separately, without the knowledge of the subject, so that it is not possible for him to tell with which eye the letters are seen, though the observer knows. BURNETT.

In the case reported by WÜRDEMANN and MURRAY (793) a man was blinded by a "short circuit" on a dynamo switch. The temporary blindness lasted about two minutes, followed by red after-images. Work was resumed in a short time, but pain in the eyes accompanied with congestion followed in the course of a few hours. The macular region was hazy and the inferior retinal veins congested; V F. contracted. In something over two weeks vision had returned to normal. BURNETT.

The patient whose history is given by VEASEY (794) was a boy of twelve years who suffered from otitis, with mastoid and sinus suppuration. The chief points of interest to the ophthalmologist are: (1) The early beginning of the neuritis after the appearance of the cerebral symptoms and the greater intensity on the side opposite to the lesion. (2) The progressiveness of the neuritis after the operation, the inflammation reaching its acme a week afterwards. (3) Early in the disease the scotomata were absolute, central in one eye, annular in the other. Later the central became larger, and remained absolute, while the annular became relative, but also increased in size.

BURNETT.

WOOD (195) gives in this paper the histories of seven cases of ocular manifestation of hysteria. Some of the conclusions he draws from a study of these cases are the following: Some symptoms, such as reversal of the color fields, the tonic form of blepharospasm, spasm of accommodation and convergence, and pseudoparalytic ptosis, may be regarded as pathognomonic of hysteria. Defects of vision are, generally speaking (with otherwise normal condition of the eye structure), hysterical if accompanied by photophobia and any form of blepharospasm. Hysterical eye troubles are common in men and children.

BURNETT.

RYERSON (796) reports two cases of eye affection after lightning stroke. In one, a girl of twenty-five years, a cataract formed in the course of a few days in both eyes. After needling vision was excellent. In the other case blinding was instantaneous—

dilatation of both pupils ; intense congestion of lids, conjunctiva and sclera. No excoriation of the parts, no considerable pain. Optic nerve and retina appeared hazy and the retinal veins were engorged. In eight weeks she was well again, with normal vision.

BURNETT.

XX.—OPTIC NERVE.

797. SCHNAUDIGEL. A case of multiple hemorrhages of the organ of vision, and particularly in the sheaths of the optic nerve. *Graefe's Archiv*, xlvii., p. 490.

798. ELSCHNIG. On the anatomy of the optic-nerve atrophy in diseases of the central nervous system. *Wiener Klin. Wochenschr.*, 1899, No. 11.

799. HEINE. Contributions to the anatomy of the myopic eye (optic disc, etc.). *Arch. f. Augenheilk.*, xxxviii., p. 277.

800. ELLINGER. Myxosarcoma of the optic nerve removed by Krönlein's method with preservation of the eyeball. *Zeitschr. f. Augenheilk.*, i., Jan., 1899.

801. VARESE. On the papillitis of disseminate sclerosis. *Arch. di Ottalm.*, v., p. 240.

SCHNAUDIGEL'S (797) patient suffered from epileptic attacks, had fallen on the pavements several times, and finally was brought to an insane asylum in a somnolent condition. Hemorrhages were found beneath the skin of the lids and beneath the conjunctiva. On the left side the disc was reddened and swollen, the arteries normal, and the veins contracted. Along the vessels were many linear hemorrhages. The patient died and an autopsy was made. Both optic nerves were of normal calibre where they passed through the optic canals, but anterior to this they were larger, and near the ball they had the characteristic ampulla shape. Microscopically, hemorrhages were found in the nerve trunk and beneath the dural sheath. The ampulla-like swelling of the nerve was due in part to extravasation of blood, but chiefly to a collection of serous, sanguinolent liquid.

ELSCHNIG (798) examined two cases of partial atrophy of the optic nerve with disseminate sclerosis, using chiefly the Marchi method and counterstaining with thionin. Throughout the nerve, but in varying degree, was an acute inflammation of the interstitial connective tissue. In places there was scarcely any inflammation and here the nerve fibres were normal. In other places

there was fresh inflammation, and here the medullary sheaths of the nerve fibres were breaking down and fatty granular cells were found. In other places still, there was interstitial hypertrophy of long standing, and here the products of nerve-fibre degeneration had disappeared.

The optic-nerve atrophy in disseminate sclerosis is, therefore, a peculiar acute interstitial inflammation which secondarily leads to destruction of the nerve fibres. The neuritis begins at different distinct points and at different times, standing in no relation to the anatomical or physiological relations of the nerve fibres.

Since the primary inflammatory nature of the sclerotic foci in brain and cord is beginning to be more generally believed in, it may be said that the optic-nerve atrophy is a process identical with the general disease.

The tumors of the optic nerve (800) are in the majority of cases benign, and therefore in operating upon them an effort should be made to preserve the eyeball. After Knapp, Schiess, and others had removed the tumor from before with preservation of the ball, Braunschweig introduced into ophthalmology Krönlein's operation of temporary resection of the outer orbital wall. ELLINGER proceeded in accordance with Braunschweig's directions in a suitable case. The patient was a girl of ten, whose left eye had been protruded and displaced outward for two years. Recently the exophthalmus had increased, and iodide of potassium proving of no avail, the operation was resorted to. The egg-shaped tumor was enclosed in a capsule. The optic nerve passed through the growth which proved to be a myxosarcoma.

XXI.—INJURIES, FOREIGN BODIES, AND PARASITES.

802. AXENFELD. On luxation, destruction, and enucleation of the eyes as a form of self-mutilation in the insane. *Zeitschr. f. Augenheilk.*, 1, Feb. 1899.

803. EVERSUSCH. An anatomically interesting case of unilateral traumatic thrombosis of the retinal veins combined with hemorrhage in the central canal of the vitreous. *Klin. Monatsbl. f. Augenheilk.*, 1899, p. 1.

804. MEYER. Ruptures of the choroid and retina from a revolver shot. "Mémoires originaux," *Revue générale d'opht.*, 1899, p. 1.

805. OSTWALT. Traumatic injury of the aortic valve followed by embolism of the central artery of the retina. *Rec. d'opht.*, 1899, p. 65.

806. FISCHER. Enophthalmus traumaticus. Atrophy of the corresponding half of the face. *Centralbl. f. Augenheilk.*, xxiii., 1899.

To the nine reported cases of self-mutilation of the eyes by the insane AXENFELD (802) adds five new cases. In these the fingers were forced into the orbit and acting like a lever with the margin of the orbit for a fulcrum the eyes were pryed out. Experiments on dead bodies proved that this was possible.

EVERSBUSCH'S (803) patient was a stone cutter of sixteen, who fell on a shovel and fractured the right superior maxilla and lost the vision of the left eye. In the vitreous was a delicate grayish-blue disc from which six divergent and slightly wrinkled grayish filaments extended forward. From the margins of the grayish disc many regularly arranged processes extended out surrounding the middle portion of the vitreous. These peculiar formations were regarded as connective-tissue remains of a hemorrhage that had radiated outward into the periphery of the vitreous through the preformed lymph spaces of the vitreous.

FISCHER'S (806) patient was a man of thirty, who fell four weeks before and struck on the upper margin of the orbit. The eye is now sunken several millimetres so that the upper lid shows a deep furrow. The optic nerve is healthy. The superior rectus is paralyzed. The adipose tissue of the entire right cheek is atrophied and the superior maxilla is depressed although no fracture can be made out.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

807. BÄCK. On leucæmic changes in the eyes. *Zeitschr. f. Augenheilk.*, 1899, No. 3.

808. WINGENROTH. Contributions to the treatment of acute inflammation of the optic nerve in consequence of influenza. *Klin. Monatsbl. f. Augenheilk.*, xxxvii., p. 85.

809. LAGLEYZE. The eye and the teeth. Pathological relations. *Arch. d'opht.*, xix., No. 3, p. 146.

810. TERRIEN. Metastatic ophthalmia followed by death. Anatomical examination. Propagation of the optic neuritis from the diseased eye to the optic nerve of the healthy eye through the chiasm. *Ibid.*, p. 170.

811. GRÖSZ. Amaurosis from acquired chronic internal hydrocephalus; puncture of the lateral ventricle; recovery. *Ung. med. Presse*, 1899. No. 13.

812. DEJESINE and LONG. On the localization of the lesion in hemianæsthesia from an affection of the capsule. *Soc. de biologie*, Dec. 24, 1898; *Ann. d'ocul.*, cxxi., p. 123.

813. DE WECKER. The danger of specific treatment in tabic atrophy of the optic nerves. *Ann. d'ocul.*, cxxi., p. 16.

814. KUHN. On acute intoxication from methyl alcohol. *Zeitschr. f. Augenheilk.*, i., Jan., 1899.

815. STRZEMINSKI. Three cases of hereditary retrobulbar neuritis in one family. *Ann. d'ocul.*, cxxi., p. 99.

816. DREYER-DUFER. A circular form of syphilitic chorio-retinitis. *Ibid.*, p. 118.

Retinitis leucæmia has long been the subject of pathological study, but the ideas as to the underlying cause have been very divergent. BÄCK (807) describes two cases. The first was in a woman of very anæmic appearance. The optic discs were reddish-yellow, elevated, and blurred at the margins. The veins were tortuous and as pale as the arteries. In the periphery were found grayish patches with hemorrhagic foci. The blood showed the usual cellular changes of leucæmia. Under the microscope the episcleral tissue was found to be infiltrated with leucocytes. The nerve head was swollen from the enormously dilated blood-vessels, and about the disc were flat accumulations of leucocytes which were found also in the periphery of the retina. The choroid had five times its normal thickness.

The second case was in a girl of twelve, and was similar. The essence of the changes consists in the increase of the leucocytes present. The new formations consist chiefly of extravasated leucocytes.

WINGENROTH (808) described three cases of pronounced papillo-retinitis following influenza. In the first case there was a large central scotoma, in the second contraction of the visual field, and in the third a negative central scotoma. Mercurials and diaphoretics caused considerable improvement.

After a short review of the anatomical relations between the eyes and teeth, and the diseases of the latter, LAGLEYZE (809) in the portion of his paper that has already appeared, takes up the various affections of the eye which may be caused by diseases of

the teeth, and are usually described as arising reflexly. He differentiates, 1, vegetative disturbances such as lachrymation, blepharitis, conjunctivitis, keratitis, and glaucoma; 2, motor disturbances such as spasm and paralysis of the muscles; and 3, nervous disturbances such as neuralgia, photophobia, amblyopia, and amaurosis.

V. MITTELSTÄDT.

TERRIEN'S (810) patient was a seamstress of thirty-nine with leucorrhœa. A streptococcus infection arising from a small polyp of the uterus led to inflammation of the right knee-joint and on the following day to a right ophthalmia. After her death, seventeen days later, it was not possible to say whether the choroid or the retina had been first involved. Besides the ocular changes there was a degeneration of the myeline sheaths of the optic-nerve fibres which could be followed up through the chiasm and tracts.

V. MITTELSTÄDT.

In a case of acquired chronic internal hydrocephalus GRÖSZ (811) was able by repeated puncture of the lateral ventricle to cure the blindness which existed. Improvement was noticed even after the first puncture, and the infant of ten months was able to see again, although only 40 *ccm* of liquid was evacuated. Three days later the vision became worse, and a second puncture was made. Seventy *ccm* of liquid was then evacuated, when the infant showed signs of collapse. The effect, however, was permanent. In this case the puncture was made through the fontanelle. In cases in which the fontanelles are closed trephining is necessary.

HERRNHEISER.

In the so-called capsular hemianæsthesia (812) the visual disturbance consists in a diminution of central vision with contraction of the field of vision of each eye toward the anæsthetic and hemiplegic side. The most typical cases are those seen in hysterical subjects, although organic hemianæsthesia may be accompanied by a homonymous hemianopsia. In all cases of hemianæsthesia with hemianopsia there is an interruption of the greater portion of the bundle of fibres that runs from the optic thalamus to the cerebral cortex. Details are given as to the exact location of the lesion in three cases examined.

SULZER.

BOOK NOTICES.

(Continued from page 483.)

XXIX. *Die Verletzungen des Auges*. Ein Handbuch für den Praktiker, by Dr. E. PRAUN, oculist at Darmstadt. 8vo, pp. 530. Wiesbaden, J. F. Bergmann, 1899.

In this book, which bears evidence of enormous literary research, the author treats of every possible injury to the eye and its appendages, and of every possible complication and result of these injuries, including such matters as wound infection and sympathetic ophthalmia. In large type, in a practical way, he gives a detailed description of each traumatic condition, with its course, diagnosis, and therapy; while in smaller type are introduced theoretical discussions, pathological descriptions, and histories of instructive cases from his own large practice in this field and from the literature.

The literary references seem to be very complete indeed; and, with its systematic arrangement, its table of contents, and its good subject and author indexes, the book forms a valuable work of reference which distinctly fills a gap in ophthalmological literature.

W. A. H.

XXX. *Beitrag zur Casuistik des Exophthalmus pulsans*. By Dr. EMIL KELLER. Inaugural dissertation. Small 8vo, pp. 208. Art. Institut Orell Füssli. Zurich, 1898.

The author in this dissertation reports two cases of pulsating exophthalmus observed in the Zurich clinic, and taking up the literature where Sattler left it off in his article in *Graefse-Sæmisch*, he adds in tabular form the histories of one hundred and two cases reported since 1880, and concludes with a consideration of the clinical course, pathology, and treatment of this condition.

W. A. H.

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Fig. 4.

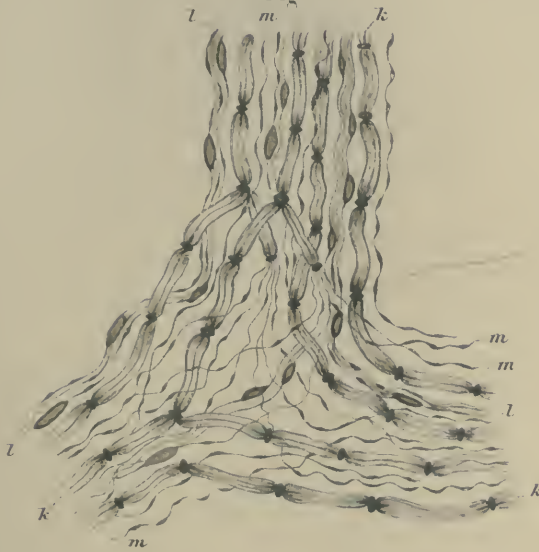


Fig. 6.

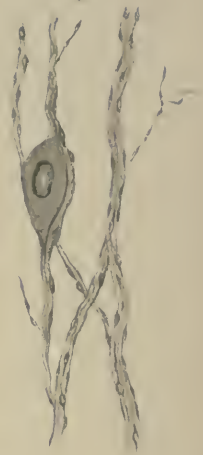


Fig. 5.

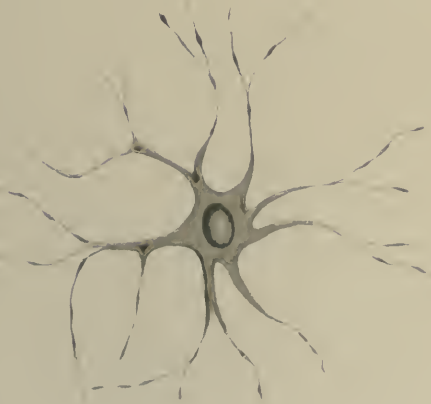


Fig. 7.

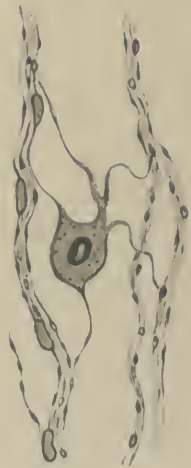


Fig. 1.

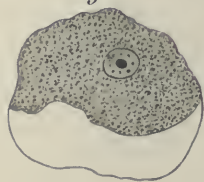


Fig. 2.

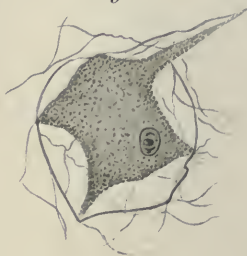


Fig. 6.

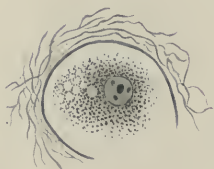


Fig. 7.

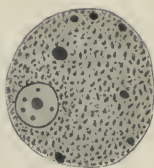


Fig. 8.

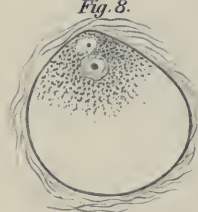


Fig. 13.

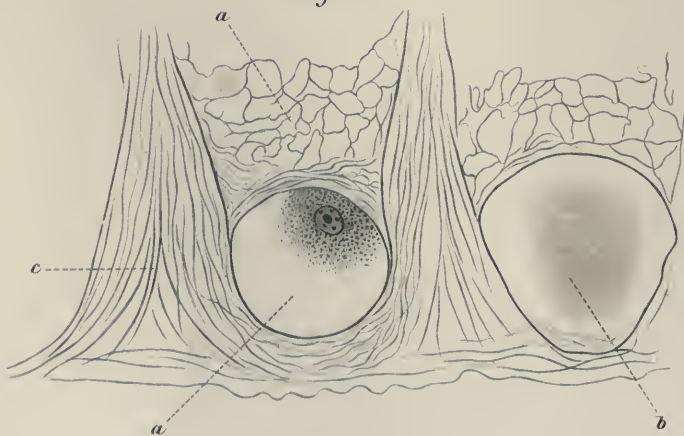


Fig. 4.

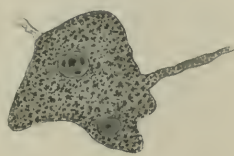


Fig. 5.

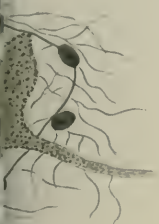
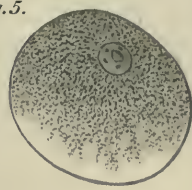


Fig. 9.

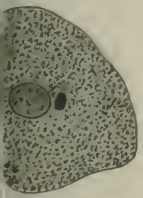


Fig. 10.

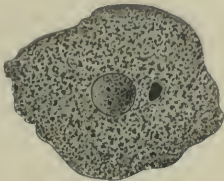


Fig. 11.

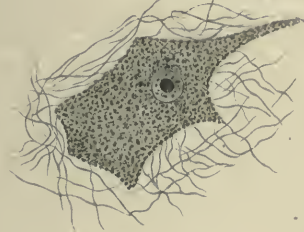


Fig. 12.

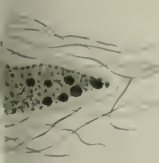


Fig. 14.



ARCHIVES OF OPHTHALMOLOGY.

ON SPONTANEOUS AND POST-OPERATIVE DETACHMENT OF THE RETINA IN MYOPIC EYES.

By PROF. CONRAD FRÖHLICH, BERLIN.

Translated from Germ. Ed., vol. xxxviii., 1, 1898, by Dr. WARD A. HOLDEN.

SINCE the publication of my results in the operative treatment of fifty myopic eyes, I have performed six more operations. In five of these there were no unusual features and the results were satisfactory. In the sixth case detachment of the retina followed the operation.

The history of this case is as follows :

W. P. a student, aged eighteen. R. with — 14. D, V = $\frac{1}{8}$. Refractive media clear. A moderately large staphyloma posticum with a black margin. The macular region exhibited some superficial white stripes. As the conditions were favorable I agreed to the desire of the boy's father that his myopia be removed so that he could follow the course he had undertaken.

November 11, 1897.—Discission was done with a needle, the anterior capsule being divided crucially. After this there was moderate swelling of the lens, and some flocculent masses sank to the bottom of the anterior chamber. Slight ciliary injection.

November 21st.—The entire lens opaque. Pupil dilated ad maximum. Linear extraction upward, the lance being entered 2 mm from the corneal margin. A large portion of the lenticular débris evacuated. No prolapse of iris or vitreous.

The eye gradually became pale. Tremulous particles of lens matter filled the pupil. The iris retracted ad maximum.

December 4th.—Paracentesis of the anterior chamber for removal of the remainder of the lens. The lance entered 1.5 mm from the outer margin of the cornea. The lens masses escaped from the eye. Pupil black. After removal of the speculum a small bead of vitreous presented in the wound, but returned spontaneously.

December 15th, the day of the patient's discharge, I found a round pupil almost wholly black. In the temporal portion lay the capsule of the lens from which a gray strand ran obliquely before the iris to the corneal cicatrix on the temporal side. Eyeball pale.

A letter from the patient the first of January, 1898, was very favorable, but another at the end of January stated that objects appeared crooked and oblique. An ophthalmoscopic examination in February confirmed my fears. In the lower portion of the fundus was a detachment of the retina. The tension was diminished.

Was the detachment due to the operation?

Those authors who would deny the connection must attribute the detachment to accident or previous disposition.

There is, however, no reason for ascribing to this eye a particular disposition toward detachment. The eye was not particularly diseased; the vitreous was free from opacities, and, as the prolapsed bead showed, not fluid. Nor did the moderately large staphyloma posticum or the superficial changes at the macula indicate excessive stretching of the coats of the eye or unusual inflammatory processes. I have operated on many eyes that were more highly disorganized without having detachment follow.

It only remains, then, to blame the incarceration of the lens capsule in the corneal wound at the second paracentesis for the unfortunate outcome.

The seven weeks that intervened between the operation and the detachment may seem a long time, but I have seen as long a time elapse in other cases. In two cases that I have already reported, the detachment came on in one, six weeks after the last operation, which was complicated with prolapse of vitreous, and in the other five weeks after the last paracentesis, which was followed by incarceration of capsule.

In looking through the cases reported by Otto¹ from Sattler's clinic, I find that in Case 28 the vitreous prolapsed during a linear extraction and detachment of the retina followed in five weeks; in Case 54 there was prolapse of vitreous

¹ *Arch. f. Ophth.*, xliii., 2.

and detachment of the retina four and one half months later; in a third case the vitreous presented twice and detachment followed in nine weeks.

Schreiber¹ also reports a case in which during linear extraction the conjunctival sac was flooded by the very fluid vitreous and detachment occurred six weeks later.

I shall limit myself to an analysis of these seven cases, from which it appears that twice a tag of lens capsule got into the corneal wound, and that five times vitreous prolapsed, and further that in all there was a considerable lapse of time before the eye was ruined by the occurrence of detachment. It is believed that this interval of time is too great to warrant the idea that the detachment is dependent upon the operative interference. It is indeed from a mechanical view-point incomprehensible that an incarceration of capsule or a prolapse of vitreous should at once cause detachment. For the quantity of prolapsed vitreous is small, and it lies between the lips of the fresh corneal wound only as a foreign body that delays the healing of the wound. But when the lips of the wound unite, the vitreous included between them becomes organized and takes part in the formation of the scar, and as the scar itself retracts it may on account of its fixed attachment exercise traction upon the retina.

Not only do these seven cases indicate that a considerable amount of time must elapse before the wound becomes firmly united, but we have an analogous situation in scleral injuries that are complicated with prolapse of vitreous. Here also the course of the healing is at first favorable, but some months later a detachment of the retina develops in connection with the scar. A series of such cases was reported by Horstmann² and myself. This author,³ in his paper on myopia, also, in speaking of the causes of detachment, stated that in four highly myopic eyes from which vitreous was lost in cataract extraction the retina became detached in all, in two cases eighteen months later, and in two six months later.

¹ *Festschr. z. F. d. 50. Bestehens d. med. Gesellsch. z. Magdeburg.*

² *Arch. f. Augenheilk.*, xxxvi., p. 193.

³ *Arch. f. Augenheilk.*, ix., p. 218.

Leber¹ says, furthermore, that after incarceration of vitreous in wounds of the cornea or sclero-corneal junction in the course of operations, a connective-tissue organization of the prolapsed part may later cause traction to be exerted, detaching the retina.

A further argument for the independence of detachment and operations for myopia is that the detachment may be the result of the myopia alone. This argument would be of value if it could be shown that detachment was no more frequent in operated eyes than in similar eyes not operated upon, but according to my own statistics the percentage is much higher in the operated eyes, a point which I shall take up more in detail later.

For this reason alone it seems to me to be much more probable that post-operative detachments, coming on some time after an operation complicated with incarceration of lens capsule or with prolapse of vitreous, are not to be regarded as idiopathic. Of course, not every prolapse of vitreous is followed by detachment. In proportion to the number of cases in which prolapse occurs, everywhere estimated at 20 per cent. (Sattler), the number of detachments is small. The consistency and size of the prolapsed portion, the extent and direction of the corneal wound, the size and strength of the vitreous band, the condition of the interior of the eye, and other factors, may well have much to do with the development of detachment.

Among fifty-six eyes operated upon I have had detachment four times. One case was due to infection, the other three were due to the operation directly. My percentage is 5.3; other operators have had a somewhat higher or a somewhat lower percentage.

The necessity of determining the percentage of detachment in cases not operated upon is evident, for Otto says that, if it is shown that the operation increases the percentage of detachments, it must be given up. This I cannot agree with, for it is possible that further modifications of a comparatively new operation will give us better results. The difficulty of obtaining correct statistics, however, is very great.

¹ *Graefe-Saemisch*, vol. v., 2, p. 699.

Otto has concluded, from a study of the records of the Leipsic clinic, that the real percentage of detachments in highly myopic eyes is from 3.67-4.72. The percentage is always higher in private practice.

One reason why it is hard to determine the exact percentage is the fact that a number of spontaneous detachments are masked by complicated cataracts or by phthisis of the ball. Furthermore, not every detachment in a highly myopic eye can be considered to be due to the myopia, for some of these detachments may prove later to have been caused by tumors and the like.

Finally, there is another point to which Mooren called attention, viz., that the patient with detachment of the retina consults a physician at every opportunity, while comparatively few of the myopic seek medical advice, and in this way misleading statistics are made up.

It is difficult also to learn the true percentage of detachments after operation, for undoubtedly, as Hirschberg and Gelpke remark, some of these are overlooked or not reported.

Furthermore, the percentage of detachments in highly myopic eyes has been based on statistics of persons of all ages, but the patients who have been operated on are in the great majority of cases under twenty-five years of age, and we have not yet followed these patients long enough to make the two categories correspond. And only after the lapse of decades shall we be able to decide whether the operation tends to lessen the liability to detachment after forty years of age, the period when it is most likely to occur in eyes that have not been operated on. At present the question to be decided is, How frequently does detachment occur in highly myopic eyes between the ages of ten and thirty?

From my polyclinic books I have collected all the cases of unilateral or bilateral myopia of 10. D or over. Between January, 1883, and January, 1898, there were, leaving out the forty cases that were selected for operation, 1193 persons with myopia of 10. D or more among 80,682 patients. Thus 1.5 % of the total number had myopia. The 1193 patients had 1957 eyes with high myopia. The following

table shows the ages of the patients, their number, the number of eyes, and the number of detachments.

Age.....	-10	11-20	21-30	31-40	41-50	51-60	61-75	Total.
Number of patients.	21	400	359	180	141	67	25	1193
Number of eyes	40	1280		637				1957
Number of detachments.....	0	16		27				43

From these figures one sees that the number of persons under ten is very small, and that it increases greatly up to the thirtieth year. From thirty it gradually falls to the fiftieth year, and then decreases rapidly to the seventy-fifth year. Similar results were found by Ott and Leininberg.

The detachment in my cases and in those of Ott and Leininberg was always unilateral, although among 1158 cases of detachment, with myopia in 918, Galezowski found detachment in both eyes in 29 cases.

Ruling out cases of complete detachment in which the refraction could not be determined, I found 2.2 % of detachments in highly myopic eyes. These figures agree fairly well with those found by others, and if we compare them with the figures for detachment in cases of myopia of any degree, it appears that the percentage is little if any higher in myopia over 10. D than in myopia in general.

In reality the percentage is higher than 2.2. If I include all the complications, such as complicated cataract, phthisis bulbi, and amaurosis, the number of which was about 50, the percentage then lies somewhere between 2.2 and 4.5, and it is impossible to determine exactly what it should be.

In collecting the cases of detachment I have noted the age, since the statements in this regard differ. Ott estimates the average age of such persons as 38.9 years, and concludes that detachment is not to be regarded as an affection of advanced age. Schweigger also concludes from his statistics that myopic detachment is scarcely an affection predominating in old age. Donders stated, on the contrary,

that the vision was often lost by detachment at the age of fifty or sixty years, if not earlier. Walters's tables showed that not less than 52.9 % of the detachments occurring in high myopia were after the age of fifty. According to Poncet most detachments occur between forty and seventy.

If I divide the decades in my table into two groups, taking thirty as the dividing line—so as to obtain a category corresponding to the young myopes operated upon—the persons under thirty number 780, with 16 detachments, and those over thirty number 413, with 27 detachments. The percentage then would be, under thirty, 2; over thirty, 6.5.

The reports of detachment after operations for myopia are as follows:

Gelpke's collection....	254	eyes with	9	detachments.
Gelpke's own cases....	15	" "	0	"
Schreiber.....	19	" "	1	"
Darier....	142	" "	4	"
Blessig.....	30	" "	2	"
Schmidt-Rimpler.....	12	" "	0	"
Fröhlich.....	56	" "	3	"

Total..... 572 eyes with 19 detachments, or 3.3 %.

This percentage corresponds fairly well to that of detachment in high myopia as found by many writers. But if we take the figures for myopia with detachment before the age of thirty the percentage is much lower. Thus in my table there were 759 persons with high myopia between the ages of ten and thirty, and 16 of these had detachment—a percentage of 1.25.

These figures show that detachment after operation is much more frequent than when no operation is done.

There is a further loss of eyes from infection. Gelpke's collection shows 2.7 % of loss from infection. We can now add later statistics to these:

Gelpke's collection.....	254	eyes with infection in	7
Gelpke's own cases.....	59	" " " "	1
Schreiber.....	19	" " " "	0
Darier.....	30	" " " "	1
Blessig.....	30	" " " "	1
Schmidt-Rimpler.....	12	" " " "	0
Fröhlich.....	56	" " " "	1

Total..... 572 eyes with infection in 11, or 2.2 %.

The total loss from detachment and infection is therefore $3.3 + 2.2 = 5.5 \%$.

All new departures in surgery cause a sacrifice. Still the course may be proper, and an improved technique may later bring down the percentage of losses.

I would mention that in my last three cases I have given up the crucial incision that I formerly made and have substituted the simple incision, as recommended by Fukala, Mooren, and Schnabel. The crucial incision leaves four movable tags, which in the paracentesis more readily become incarcerated than the edges of a simple incision. I now make a horizontal incision low down, so as to be as far away as possible from the linear section which I make in the upper part of the cornea.

ON A CASE OF PAPILLO-RETINITIS DUE TO CHLOROSIS.

BY DR. W. SCHMIDT,

ASSISTANT TO THE UNIVERSITY EYE CLINIC IN LEIPSIK.

Translated by Dr. WARD A. HOLDEN.

(*With two charts of the visual field on Plate VI., of Vol. XXXIV., German Edition, 1897.*)

SINCE two rare cases of optic neuritis were published independently of each other in the same number of the *Deutsche med. Wochens.* (No. 28, 1896), I am led to record the clinical history of a similar case which was at that time under treatment in this clinic. The case is of interest, as it is in almost all respects similar to that reported by Dieballa, while the case reported by Schanz is in its etiological features of value in judging our own case.

A girl of fourteen came to the clinic June 8th, with the complaint that her vision was not so good as formerly. As a child she had had no severe illness except measles, and tonsillitis at times. Her father died of an injury; her mother is living, but formerly was epileptic. The patient's vision was good until recently. About a year ago she began to have pressing and boring pains of varying intensity in the head, which could not always be localized, but sometimes occurred in the temporal regions and more frequently at the vertex. At Christmas in 1895, vomiting and giddiness came on daily after meals, the patient noticed a beginning failure of vision, and there was some spasmodic stiffness of the limbs.

St. pr.—Patient is of medium size, well developed for her age, and of anæmic appearance. The lips and conjunctiva are pale.

The condition of the eyes is as follows: Refraction, by skiascopy, R + 4, L + 3; R V = $\frac{6}{8}$, with + 1.75 $\frac{6}{4}$; L V = $\frac{6}{4}$, with + 1.75 $\frac{6}{8}$.

Ophthalmoscopically, right, the disc is greatly swollen and enlarged. The margins are not sharply outlined and the entrance of the vessels is obscured. The veins are dilated and tortuous, the arteries thin. There are a few small hemorrhages and sharply-outlined white plaques of different sizes scattered over the retina, and about the macula in a semicircular zone is a sprinkling of small glistening points and patches.

In the left eye the changes are similar but less pronounced.

On both sides the vessels bend back at the margin of the disc, but not abruptly, and the swelling of the disc passes over gradually into the normal level of the fundus. The difference in level corresponds to 2. - 3. D.

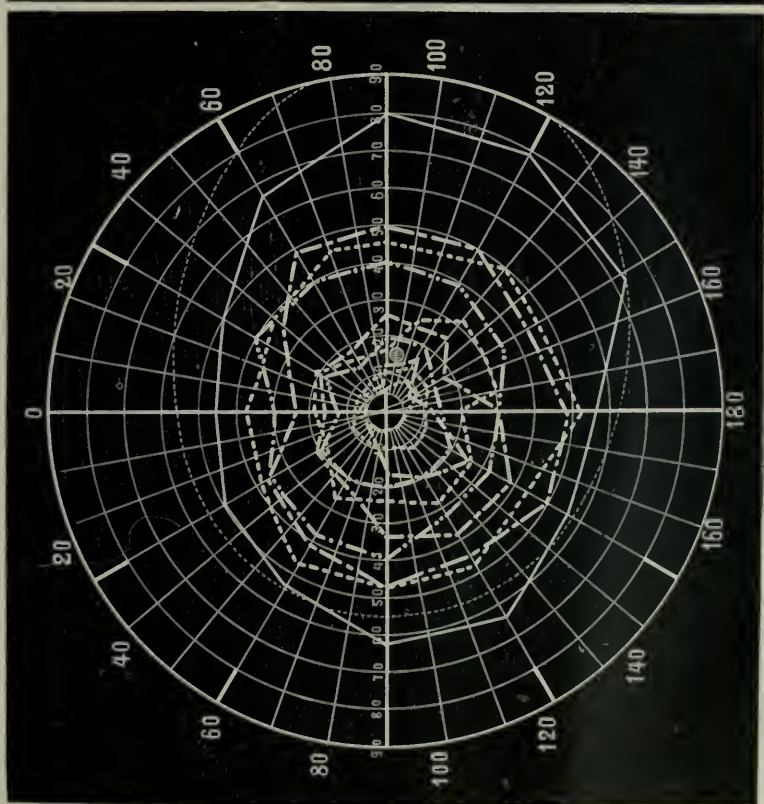
Diagnosis: Papillo-retinitis of each eye. The retinal picture, with the radially arranged groups of white dots about the macula and the larger white patches scattered over the fundus, suggested albuminuria, but neither albumen nor sugar was found in the urine at any time.

The constant headache then suggested a cerebral origin for the retinal trouble, but an examination in the medical clinic revealed no abnormalities on the part of the nervous system. There were also no evidences of hereditary syphilis.

Since the etiology of the condition was not clear, the patient was put on iodide of potassium, iron, and a strengthening diet. In a short time the general condition improved and the headaches diminished. The vision at first grew worse and then began to improve. Later the headaches returned and the patient was again sent to the medical clinic, where the diagnosis "hysteria" was made.

The vision gradually improved. There was, however, a broad ring scotoma for all colors and a slight peripheric contraction of the visual field.

The patient was sent a third time to the medical clinic, July 17th, because it seemed that the persistent anæmia might have something to do with the retinal condition. An examination of the blood then showed that it was a pure case of chlorosis. The hæmoglobin was diminished while the number both of red and of white corpuscles was normal.



The questions which naturally present themselves are: "Was the chlorosis really the cause of the papillo-retinitis?" and "How is this to be explained?"

As stated above, our first suspicion was of albuminuria, but repeated examinations of the urine failed to reveal either albumen or sugar.

The continuous headache in the beginning suggested a cerebral cause for the papillitis, and for several days the patient definitely located the seat of the pain at the vertex, and an area here was sensitive to percussion. Later she contradicted herself, did not complain spontaneously of headache, and when questioned located the pain first at one spot and then at another. These symptoms suggested hysteria rather than an organic cerebral affection. The diagnosis of hysteria was made in the medical clinic also. The sensibility of the throat and corneas was reduced, there was ovarian pain, and the patient's description of her symptoms seemed exaggerated. Furthermore, the acuteness of vision varied without changes in the fundus, and the visual fields differed at every examination, so that it was long before a fairly constant condition could be mapped out, such as is shown in Plate VI. Apart from the scotoma, the limits of the color fields showed a partial reversal of sequence which also suggested hysteria.

But, finally, although there were no other marked general disturbances, and she had had no hemorrhages, in fact had not even menstruated, we were forced to the conclusion that this was one of the rare cases of papillitis dependent upon chlorosis. The results of treatment directed toward the chlorosis, and especially the improvement in the eye symptoms, verified the diagnosis.

The author then refers to cases similar to his own reported by Dieballa, Bitsch,¹ Gowers,² Williams,³ and Mackenzie.⁴ Dieballa believes that the increased deglobulization is the true cause of the papillo-retinitis, and the author agrees with him. Taking up for comparison cases of transient

¹ *Klin. Monatsbl. f. Augenheilk.*, xvii., p. 144.

² *British Med. Jour.*, 1881, I, p. 796.

³ *Ibid.*, 1884, I, p. 10.

⁴ *Ibid.*, 1885, I, p. 328.

blindness during lactation, the author agrees with Heintel¹ that, as neuritis is caused by lead, arsenic, alcohol, quinine, tobacco, and the toxins of syphilis and tuberculosis, it is likely that in lactation at times altered metabolism leads to the production of toxins which cause optic neuritis. He quotes Nettleship,² however, as saying: "We may fairly assume that these rare cases are to be grouped rather with optic neuritis which is sometimes seen in chronic anæmia than with any other form of neuro-retinitis caused by the retention of injurious substances in the blood."

In conclusion, the author expresses his thanks to Professor Sattler for assistance in his work.

¹ *Beitr. z. Augenheilk.*, xiii., p. 99.

² *Royal London Ophthal. Hospital Reports*, xiii., p. 97.

(Oliver has since reported in detail the eye changes in six cases of anæmia of various sorts.—*Trans. Amer. Ophth. Soc.*, 1897, and *Annals of Ophth.*, 1897.—TRANS.)

CONTRIBUTIONS TO THE EMBRYOLOGY OF THE LENS.

BY DR. C. RITTER, BREMERVÖRDE.

Abridged Translation by Dr. WARD A. HOLDEN.

(*With six figures on Plate X. of Vol. XXXIV., German Edition, 1897.*)

I.—THE FORMATION OF THE MIDDLE OF THE LENS.

AFTER occupying myself for a long time with the development of the lens I still find many problems unsolved. My investigations have been confined to the lenses of fishes, amphibians, and reptiles. In these classes the relations of the lens fibres are simpler and easier to understand.

In beginning my descriptions with the middle of the frog's lens I wish first to correct a former error. Many years ago I discovered that there were nucleated, irregularly formed fibres in the middle of the frog's lens, and since similar but non-nucleated fibres were found here in other animals I was led to believe that there was a formative centre in the middle of the lens. Henle and O. Becker quickly disproved my views and I myself gave them up.

These nucleated fibres are not found in the lenses of all grown frogs, but the same curious forms are found here in every frog's lens. Henle pictured these in his work, although nuclei were not present as in Figs. 1 and 2, Pl. X. The middle of the frog's lens is entirely formed of these irregular fibres. When we examine the centre of the lens in frog larvæ we find these same fibres. Fig. 1, Plate X., is from the full-grown frog, Fig. 2 from the larva. For the most part,

the fibres are broad in the middle and pointed at each end. In the larvæ all are nucleated, in the grown animal only a part. It is known, however, that the nuclei of the nerve fibres disappear with age. But since exactly the same forms of fibres are found in the middle of the lens both in the larva and the full-grown animal we must conclude that the lens fibres of the frog last through life. A regeneration of these cells seems to be impossible. This view may be held by many histologists but it has never been expressed. However, I have found one exception that to my mind throws doubt upon this conception as a general rule.

A very interesting object is the lens of the young eel. At the age of two months the eel is 10 *cm* long and the spherical lens is 0.9 *mm* in diameter. It is composed of layers of lens fibres, the inner fibres being narrower than the outer. The outer fibres attain, in the region of the equator, an excessive breadth, being sometimes as wide as 0.04 *mm* (Fig. 3). They contain very large oval nuclei.

According to the theory previously mentioned, these fibres should be found also in the lens of the full-grown eel. The lens in the full-grown eel is 3 *mm* in diameter and perfectly spherical. In the peripheric fibres are found well marked nuclei corresponding to those found in the peripheric fibres of the lens in the young eel. But nearer the centre of the lens no nuclei are found and the fibres are very much narrower and have notched margins (Fig. 4). So in this case at least the theory that the lens fibres when once formed remain at the same place and in the same form to the end of the animal's life does not hold good.

II.—THE CHANGES IN THE NUCLEI OF THE FIBRES OF THE LENS.

It is known that the nuclei of the fibres of the lens develop from the nuclei of the capsular epithelium, increase in length, and finally disappear gradually. The details of the process have not been accurately followed.

The nuclei of the epithelial cells are originally round. Behind the equator of the lens the nuclei assume an oblique position and the cells develop into fibres. The nuclei

increase in length as the cells extend out into fibres, and the elliptical nuclei may become ten times as long as their original diameter.

In most fishes, and in the frogs, toads, and reptiles, the nuclei are elliptical in the larvæ; in the eels, the salamanders, and herrings they are round.

As new layers of fibres are added to the lens the nuclei gradually disappear. Henle said that the nuclei seemed to atrophy from the periphery; Becker spoke of a granular degeneration. In fact, after the nuclei have reached their maximum size they begin to diminish, first in width and later in breadth, and gradually grow smaller (Fig. 6). Granular changes that have been described in the nuclei are artefacts due to the hardening fluid.

The best means of rendering the nucleus visible without materially changing its structure is to treat the specimens with dilute mineral acids.

Explanation of the Figures.

Fig. 1 is magnified 480 times, the other figures 350.

Fig. 1. Fibres of the middle of the lens in the grown frog.

Fig. 2. Fibres of the middle of the lens in the larva of the frog.

Fig. 3. Fibres of the young eel 1.5 *mm* from the middle of the lens.

Fig. 4. Fibres of the grown eel 1.5 *mm* from the middle of the lens.

Fig. 5. Nuclei of the larva of the salmon: (a) capsular epithelium, (b) outer fibres, (c) largest nuclei, (d) and (e) nuclei diminishing in size.

Fig. 6. Nuclei of the grown eel: (a) capsular epithelium, (b) large nuclei, (c) and (d) diminishing nuclei.

Fig. 1.

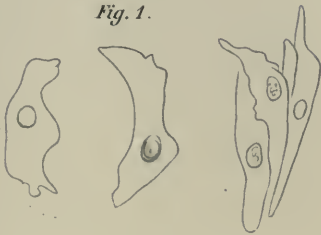


Fig. 2.

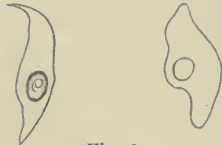


Fig. 3.



Fig. 4.



Fig. 5.

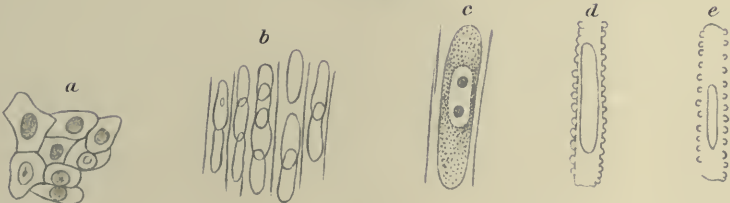


Fig. 6.



BINOCULAR VISION AFTER EXTRACTION OF SENILE CATARACT OF ONE EYE.

BY DR. EDGAR S. THOMSON, NEW YORK.

Mrs. S., aged sixty-three, widow, consulted me May 20, 1899, for a failure of vision in the right eye which she thought had come on in four weeks.

The following tests were made :

R. V. = $\frac{2}{200}$: not improved with glasses.

L. V. = $\frac{2}{40}$ - : $\frac{2}{40}$ w + 1.50 D. S.

Javal, ophthalmometer, 0.50 D. with the rule, in each eye.

By the ophthalmoscope a senile cataract was found in the right eye, almost mature, with only a small amount of clear lens substance anteriorly. The tension was normal, field good, projection accurate.

The left eye showed numerous marginal opacities of the lens with several striæ running entirely to the centre in the lines of the junction of the lens sectors. Fundus normal.

June 3d.—A simple extraction was done under cocaine ; the operation was smooth. The reaction very slight, and the only deviation from the usual course of healing was a somewhat tardy closure of the wound which did not unite until the fourth day. There was a slight attack of iritis and a small anterior synechia formed on the nasal end of the wound, hardly enough, however, to distort the pupil. The dressings were removed on the eleventh day.

June 23d.—The tests were as follows :

Javal, R. 7 D., ax. 130° or 40°.

R. V. = $\frac{2}{100}$ w + 8 D. S. \subset + 4 D. C., ax. 130°.

June 28th.—The vision had increased to $\frac{2}{40}$ -, and binocular

vision was obtained with the distance correction on each eye. One month later the final tests were made with the following results :

Javal, R. 1 D., ax. 140°.

R. V. = $\frac{2}{8}$ + w + 10 D. S. \bigcirc + 1.50 D. C., ax. 140°.

Jäger 1 at 10 in. w + 13 D. S. \bigcirc above cylinder.

These were prescribed for her, together with the correction for the left eye, which was + 1 D. S. for distance, and + 2.50 D. S. for near (10 in.).

With these she has binocular vision both for the distance and for the near. She says that the image in the right eye is only very slightly larger than that in the left, and she responds readily to each test for binocular vision, and wears the glasses with comfort.

Knapp (*System of Eye Disease*, Norris and Oliver, iii.), in discussing the advisability of operating on one eye when the other still sees well, says that stereoscopic vision is restored in a certain number of cases.

It seems probable to the writer that more of such cases would be observed than now are met with, if an attempt were made in every case to fit the aphakial eye.

BUPHTHALMUS WITH LENTICONUS POSTERIOR.

By DR. ED. PERGENS, BRUSSELS.

(FROM THE INSTITUT OPHTALMIQUE DU BRABANT.)

Translated by Dr. WARD A. HOLDEN.

(*With four figures on Plate I., Vol. XXXV., Germ. Ed.*)

THE case here reported is the first in which lenticonus posterior in man has been examined microscopically.

Karl B., æt. four and a half years, was brought to the institute on account of prominence and inflammation of the left eye. The eye is distended so that it presents the picture of buphthalmus with pronounced keratoglobus. The tension is increased to $T + 2$. The lids can be closed over the ball. The conjunctiva is reddened but there is no chemosis. The cornea is clear with the exception of a spot in the lower outer quadrant, 3 or 4 mm square, where paracentesis had been made at another clinic.

The iris reacts neither to light nor in convergence. The pupil is small, and pyramidal cataract prevents a view of the deeper parts. When the head is thrown back there is a partial trembling of the iris. There is no perception of light. On account of the violent circumorbital pain the ball was enucleated.

The right eye is entirely normal.

When the child was three years old the parents noticed "that the left eye grew faster than the right"; later an oculist was consulted who within three years performed paracentesis of the cornea six times. Whether the corneal opacity followed the operations or whether a spot already opaque was chosen for the puncture the parents are unable to say. An iridectomy was never proposed.

The ball was cut in half and hardened in chromic acid, after

which one half was preserved in glycerine jelly and the other was cut in sections.

The ball was 31.6 mm in antero-posterior diameter, 28.5 mm in vertical diameter, and 25.5 mm in lateral, although it was punctured in the course of the enucleation. The anterior chamber was 7 mm deep.

From limbus the insertion of superior rectus was distant	11. mm
“ “ “ inferior “ “	9.2 mm
“ “ “ internal “ “	8. mm
“ “ “ external “ “	9.5 mm
“ “ “ superior oblique “ “	18.3 mm
“ “ “ inferior “ “	26. mm

Fig. 1 shows one half of the ball, natural size. At A, the cornea received a small punctured wound through which the iris at once prolapsed, and therefore this part will not be taken into consideration in my description.

One is at once struck by the peculiar form of the lens. Anteriorly there is a pyramidal cataract, about which are spots of pigment from the posterior surface of the iris, indicative of previous extensive posterior synechiæ. The entire posterior part of the lens is of conical form. This part also is cloudy with the exception of a portion G nearer the centre, which is of normal appearance. The optic nerve exhibits a glaucomatous excavation.

In sections, one sees that the cornea in the middle portion is 0.55 mm thick. The projection was chiefly due to stretching of the sclero-corneal junction, as is shown in Fig. 2. The corneal epithelium (Fig. 3) consists, on the surface, of a layer of flattened cells (cut) forming a cuticular membrane, and beneath this of normal cells. The membrane of Bowman is normal at some points, thinned at others (Fig. 3), and here and there destroyed.

The substantia propria of the cornea is normal, as is also the membrane of Descemet and its endothelial layer. Schlemm's canal seems to have disappeared at some points.

The anterior ciliary veins and the vasa vorticosa are dilated and congested, but there is no proliferation of endothelium. The thinned portion of the sclera shows no particular changes. The angle of the anterior chamber is not obliterated but is freely open. The iris is more or less completely detached from the ciliary body, but in many places it is still retained by fibres of the ligamentum pectinatum and masses of exudation. The entire iris is displaced forward, giving one the impression that previously there had been



an adhesion of the angle of the chamber and with the stretching of the sclero-corneal junction a tearing loose of the iris from its attachment so that the angle of the chamber again became free. The iris now appears to have sprung from the cornea. The crypts of the iris are enlarged, the sphincter is not atrophic.

The ciliary muscle is well developed, but the ciliary processes are elongated in various directions. The choroid is thinned and its vessels are small although no degeneration of the vessel walls is apparent.

The zonula fibres are increased in number and in length as though, having a heavier lens to carry, they had grown stronger. The lens including the pyramidal cataract is 7.6 mm in antero-posterior diameter and 9 mm in transverse. The pyramidal cataract is 3 mm broad at its base, and about 0.75 mm high. It is quite possible that this pyramidal cataract was produced by a further growth of the lens through the pupil while the circular synechia restricted its lateral extension, as evidenced by a depression about the cataract. The capsule of the lens is normal anteriorly, but it is very thin posteriorly, particularly to the nasal side where there was probably a rupture. The capsule is normal over the pyramidal cataract, and the substance of the latter is a direct continuation of the anterior epithelium. Some fibres in the periphery of the lens are normal, and there is a normal area at p. norm. Fig. 4, but the remainder of the lens is made up of vacuoles, Morgagnian globules, detritus, and other granular masses.

The retina exhibits some changes in the rods and cones. The optic disc is excavated and the nerve fibres have mostly disappeared and been replaced with new connective tissue. No trace of a hyaloid artery was to be found.

Since the right eye was entirely normal, the left eye only being affected, the cause of the disease must be sought for in the local conditions of the eye. I believe that the lenticonus may be considered the cause of the buphthalmus. The lenticonus may have been congenital, but the pyramidal cataract appears to have enlarged after the synechiæ formed.

The size and weight of this lens would cause this case of buphthalmus to be put into that category of glaucoma cases which Priestley Smith believes to be due to a large lens.

The reason that other cases of lenticonus have not been complicated with glaucoma, is perhaps the small size of the conus which skiascopic examination in most cases has shown to be a

spherical projection; the rabbit's lens examined by Becker also had a spherical projection. The pig's eye and the rabbit's eye examined by Hess had very large lenses, but little is said about the rest of the eyeball, though, so far as can be learned, the chamber angle seemed to be normal and the ciliary body and iris healthy.

The rational therapy would have been to extract the lens with iridectomy as soon as the ball began to enlarge.

Pathological examinations have been made of three animals' eyes with lenticonus.

Otto Becker¹ received from Uhthoff a specimen from a rabbit which had lenticonus in each eye. Posteriorly there was a process 1.5 mm high, somewhat constricted at the base, and covered in greater part or completely with normal capsule. Probably the entire mass was transparent. Hess² examined a pig's lens with lenticonus. The anterior portion of the lens was normal, the posterior portion conical. There was posterior polar cataract. The capsule was thinned, but whether ruptured or not could not be made out with certainty.

Hess's rabbit's lens was obtained from an otherwise normal animal two months old. There was a conical process at the posterior pole of the lens. The fibres were almost all displaced. Normal lens tissue alternated with Morgagnian globules and detritus. Posteriorly the capsule was very thin and Hess thought that previously there had been a break there. There was no nucleus in the lens. Posteriorly there was a slight opacity.

In the second eye of this rabbit the lens had a nucleus, and there was posterior polar opacity but no lenticonus.

In man the following cases have been diagnosed clinically:

1. F. MEYER, 1888. A case of lenticonus posterior. *Centralbl. f. prakt. Augenheilk.*, xii., p. 41. A boy of ten had a lenticonus in the right eye which diverged slightly. With this eye he counted fingers at 3.5 m and read Jaeger No. 9 at 5 cm. With — 12. D he saw somewhat better. There was a posterior polar cataract. The condition was probably congenital. The left eye was normal.

¹ *Anatomie der gesunden und kranken Linse*, 1883, p. 125.

² *Path. anat. Studien*, 1896. "Histologische Studien über Lenticonus posterior." *Graefe's Archiv*, xlii., 3, p. 234.

2. R. W. DOYNE, 1889. A peculiar form of lens degeneration. *Trans. Ophth. Soc. Un. K.*, ix., p. 113. A woman of seventy had seen poorly for several years. A diagnosis of lenticonus was made. The periphery of the lens had a myopia of -3 . D and the centre of -14 . D. With -14 . D, $V = \frac{6}{36}$.

3. HARTRIDGE, 1889. *Trans. Ophth. Soc. Un. K.*, ix., p. 115. The patient was a girl of seventeen with congenital lenticonus in both eyes. The refraction was 5. D higher in the middle of the lens than in the periphery.

4. KNAPP, 1889. A case of lenticonus posterior. *ARCH. OF OPHTHAL.*, xviii., p. 451. *Arch. f. Augenheilk.*, xxii., p. 28. A girl of eight had in the right eye lenticonus posterior without opacities. She counted fingers at twelve feet. There was moderate divergent strabismus. With $-\frac{1}{2}$, $V = \frac{20}{200}$. Left eye normal.

5. KNAGGS, 1891. On lenticonus. *Lancet*, vol. (?). A woman of fifty-six had had good vision until six months before. R with -10 . -1 . c, $V = \frac{6}{12}$; L with -11 , $V = \frac{6}{18}$. Jaeger No. 8 at 4.5 inches without glasses. Both eyes had lenticonus posterior with posterior polar cataract. The patient had been deaf since her twenty-seventh year and suffered from oxaluria. The lenticonus was not congenital.

6. WEEKS, 1891. A case of lenticonus posterior, with remarks. *ARCH. OF OPHTH.*, xx., p. 260. A girl of eight had strabismus of the left eye. This eye had lenticonus posterior. $V = \frac{2}{20}$, and glasses gave no improvement. In the periphery of the lens there was hyperopia of 3. D, and in the centre myopia of 12. D. The right eye was normal except for two thin filaments on the iris, remains of the pupillary membrane. R $V = \frac{2}{20}$, emmetropia. The condition in the left eye was congenital. There was posterior polar cataract, and remains of foetal arteries could be seen.

7. EISECK, 1892. A case of lenticonus posterior. *Klin. Monatsbl. f. Augenheilk.*, xxx., p. 116. A woman of thirty-six had vision L $\frac{2}{20}$, R $\frac{1}{10}$, not improved with glasses. The right eye had had poor vision from the patient's youth. There was lenticonus with posterior polar cataract.

8. GULLSTRAND, 1892. A case of lenticonus posterior. *Nord. Ophth. Tidskr.*, v., p. 18. A man of thirty had normal vision in the right eye. He had noticed in his twelfth or thirteenth year that the sight of the left eye was poor without recognizing any cause for it. There was slight divergent strabismus, $V = \frac{1}{10}$. The refraction was stated to be emmetropic,

although there were lenticonus posterior and posterior polar cataract.

9. MITVALSKY, 1892. A new case of lenticonus posterior with partial persistence of the hyaloid artery. *Centralbl. f. prakt. Augenheilk.*, xvi., p. 65. A girl of eight had normal vision in the right eye with + 2. D. The left eye could count fingers at 1 metre. There was lenticonus posterior, with a slight posterior polar cataract and a white opacity in the upper-inner quadrant of the lens capsule. In the centre of the lens there was myopia of 20. D, in the periphery hyperopia of 4. D. Attached to the posterior capsule of the lens was a filament 2 mm long, which extended back into the vitreous and was considered to be the remains of the hyaloid artery. The malformation, therefore, was probably congenital.

10. L. MÜLLER, 1894. Does lenticonus consist in an anomaly of the posterior surface of the lens? *Klin. Monatsbl.*, xxxii., p. 178. The first case was in a boy of eighteen with normal vision and hyperopia of 1. D in his left eye. In the right eye the fundus could be seen through the centre of the lens without any correction, and through the periphery of the lens with - 2.5 D. $V = \frac{6}{36}$, and Sn. 2.25 at 25 cm. The lens has no polar cataract, but the anterior surface was more curved than normal, though not sufficiently to change the weak refraction of the central portion of the lens to the myopic. Müller thinks that the designation "lenticonus" should not be applied in cases in which no anatomical examination is made, but he would describe the condition as "a lens with double focus."

11. MÜLLER—SALZMANN, *ibid.*, p 184. A girl of ten had R with + 1.25 + 2. c v, $V = \frac{6}{36}$?; L with 9. D $\frac{6}{36}$. Downward and outward there was a T-shaped opacity of the lens. The periphery has a refraction of - 4. D, the central part of - 13. D.

12. ELSCHNIG, 1895. Lenticonus posterior. *Klin. Monatsbl.*, xxxiii., p. 239. A girl of seventeen was emmetropic in the left eye, in the right there was lenticonus posterior, with posterior polar cataract, and some scattered patches of opacity. Through the periphery of the lens the refraction was + 4. D with some astigmatism, in the centre it was - 30. D. This eye could count fingers at a short distance with uncertain fixation.

13. LANG, 1895. Lenticonus posterior. *Trans. Ophth. Soc. Un. K.* (Original not obtainable.)

14. SYM, 1895. A case of lenticonus posterior. *Ophth. Review*,

xxiv., p. 76. A woman of fifty-two had R with -9 . D, $V = \frac{30}{80}$; L with -15 . D, fingers counted at 2 m. In the left eye besides the lenticonus, there were changes in the choroid but no opacities and no signs of a hyaloid artery.

15. CRAMER, 1896. A case of lenticonus posterior. *Klin. Monatsbl.*, xxxiv., p. 278. A girl of nine had in one eye with $+2$. c v, $V = \frac{30}{80}$. The other eye could count fingers at 16 feet. In the latter were found corneal astigmatism and lenticonus posterior, but without opacities of the lens. No strabismus. The refraction at the margin of the lens was $+3$. D, through the centre -11 . D.

Müller states, in his paper on this subject, that one cannot say with certainty whether there is merely a difference in the refraction of the nucleus of the lens, or an actual lenticonus. In his case the nucleus appeared to be absent, or partially absorbed, hence the normal refraction of the central part.

Demicheri¹ also accepted this explanation to account for the myopia in beginning cataract, from the increased refractive index of the lens, the nucleus often being more affected than the cortex, so that the condition resembles that seen in lenticonus. These cases come into Müller's category of lenses with double focus, which seems to me a fitting name.

Besides the refraction, another characteristic of false and true lenticonus posterior is the condition of the Purkinje figures. That of the posterior surface of the lens, as soon as it reaches the margin of the conus, doubles, elongates, or disappears. Also, one notices kaleidoscopic appearances in the fundus. A fourth point which may be mentioned is the presence of a dark ring seen about the conus in retinoscopy.

Explanation of the Figures on Plate I.

FIG. 1.—Section of eyeball. *A*, the point where the ball was punctured in the course of the operation. *B*, the lens with anterior pyramidal cataract and lenticonus posterior. *C*, transparent portion of the lens.

¹ "Faux lenticone," 1895., *Ann. d'ocul.*, cxliii., p. 93.

FIG. 2.—Meridional section. *Corn.*, cornea. *C. scl.*, distended sclero-corneal junction. *C. cil.*, ciliary body. *Proc. cil.*, elongated ciliary processes. *Zon.*, zonula fibres. *L.*, lens. *Exs.*, exudation at the ruptured base of the iris. *Ir.*, iris. *Scler.*, sclera.

FIG. 3.—Corneal epithelium. Zeiss F. oc. 2. *Cut.*, cuticular layer. *Ep.*, epithelium. *I. B.*, Bowman's membrane.

FIG. 4.—Section of the lens. *Syn. p.*, posterior synechiæ, now broken up; *p. norm.*, normal portion of lens; *vac.*, vacuoles; *M. K.*, Morgagnian globules.

ABSTRACTS OF THE PAPERS IN VOL. XXXIV.
(1897) OF THE GERMAN EDITION OF THESE
ARCHIVES NOT PREVIOUSLY TRANSLATED.

By DR. WARD A. HOLDEN.

VI.—BACTERIOLOGICAL INVESTIGATIONS ON THE INFLU-
ENCE OF ANTISEPTIC DRESSINGS ON THE BACTERIA
IN THE CONJUNCTIVAL SAC AND ON THE MARGIN
OF THE LID.

By DR. L. BACH,

PRIVAT-DOCENT AND FIRST ASSISTANT TO THE UNIVERSITY EYE CLINIC AT WÜRZBURG.

THE present paper forms a continuation of the author's previous studies, and its purpose is to make clear the question as to the possibility of sterilizing the conjunctival sac and margin of the lid.

The use of moist applications of antiseptics is very general, and it is therefore of interest to determine by a great number of experiments whether such therapeutic measures are of any efficacy from a bacteriological point of view.

In order to have quantities of bacteria present I inoculated the conjunctival sac and lid margin with a harmless bacterium. Then a platinum loop was passed several times over the lower cul-de-sac, and agar plates were inoculated. The loop was then rubbed along the margins of both lids and other plates were inoculated. After this a pledget of cotton was dipped in bichloride solution 1:3000 or 1:1000, or into hydrarg. oxycyanat. 1:1000, and after being squeezed nearly dry was applied to the closed lids. The pledgets

were changed every forty-five minutes for seven or eight hours and then the inoculation on agar plates repeated.

As a control test a number of patients were inoculated in the same way, but no therapy of any sort was undertaken.

Tabular results of the experiments are given. In general it appeared that in almost all cases the quantity of bacteria in the conjunctival sac diminished. This, however, the author attributes to the effect produced by winking the lids.

The bacteria on the lid margin were also reduced in many cases, and here the result seemed to be due to the use of the antiseptic, although it did not matter which antiseptic was used.

Thus it is seen that sterility of the conjunctiva and lid margin is not to be obtained by using antiseptics, but rather by mechanical cleansing.

X.—ON HUTCHINSON'S AFFECTION OF THE FUNDUS (RETINITIS CIRCINATA, FUGHS).

BY PROF. GOLDZIEHER, BUDAPEST.

In the *Wiener med. Wochenschr.*, 1887, No. 26, I described a peculiar form of retinal disease, then practically unknown, which I had observed in three patients. The nearest description that I could find in literature was that of J. Hutchinson in vol. xiii. of the *Ophthalmic Hospital Reports*, under the title, "Symmetrical Central Choroido-retinal Disease Occurring in Senile Persons." He says that old people are those chiefly affected, that they are otherwise healthy, and that women are more frequently affected than men. They all have reduced central vision. The disc and the retinal vessels are normal. There are changes in the middle of the retina consisting of yellowish-white lustrous spots which become confluent and form large plaques with irregular margins. The spots are not surrounded with pigment, and the only pigment found is due to retinal hemorrhages, which are usually present near the macula. The periphery of the retina is healthy.

My paper seemed to have been almost entirely overlooked when Fuchs published his paper on "Retinitis Circinata,"

in which he described exactly my "Hutchinson's Affection of the Fundus."

Further clinical histories follow of this affection which is now fairly familiar. A long discussion as to the probable pathology may be omitted, since Ammann (these ARCHIVES, xxvii., 2) has found that the retinal changes are such as result from hemorrhage.

XII.—ON THE PATHOLOGICAL ANATOMY OF SPONTANEOUS LUXATION OF THE LENS INTO THE ANTERIOR CHAMBER.

BY DR. K. RUMSCHEWITSCH, KIEFF.

The author gives a detailed clinical and anatomical description of two eyes that were enucleated for glaucoma after luxation of the lens into the anterior chamber. He ends the paper as follows:

The results obtained in the examination of the two cases do not permit any general conclusions to be drawn, nor do they explain the mode of origin of the luxation, since the two cases were of quite different character; and I shall only call attention to two circumstances. In the first place, the results show conclusively that the zonula stands in no relation to the hyaloid membrane. In all the descriptions of luxated lenses, no traces of zonula fibres have been found on the capsule of the lens. The anterior attachment of the zonula is always torn, never the posterior.

The condition of the zonula is a factor to which considerable attention must be given in cases of luxation of the lens. Although anatomical observations in this regard have been very few, it must always be repeated that the cause of spontaneous luxation lies in the maceration or in the atrophy of the zonula. In my first case, the zonula was very well preserved, and its fibres were fully developed, so that there could be no possibility of maceration, and yet there was luxation. The only probable explanation is that there was so great an extension of the anterior segment of the ball that the elasticity of the zonula was overcome. In the second case there was no such extension, but the spaces between the various tissues of the eye were enlarged and filled

with an albuminous liquid. Under these circumstances the zonula fibres might easily have suffered maceration. The changes found in the fibres, in fact, indicate such maceration. This case, therefore, supports the supposition already expressed as to the changes in the zonula which permit luxation.

XIII.—THE DIMINUTION IN THE REFRACTION OF THE EYE CAUSED BY THE REMOVAL OF THE LENS.

BY DR. MAXIMILIAN SALZMANN, PRIVAT-DOCENT, VIENNA.

This is a mathematical paper which does not lend itself to condensation.

XVIII.—A CLINICAL AND PATHOLOGICAL CONTRIBUTION TO THE SUBJECT OF TUBERCULOSIS OF THE LACHRYMAL GLAND.

BY DR. JACOB SÜSSKIND, STUTTGART.
(FROM THE UNIVERSITY EYE CLINIC, WÜRZBURG.)

Although tuberculosis shows a special preference for glandular organs, the tuberculous affections of the lachrymal gland are exceedingly rare. Four years ago the first case of this sort was described by De Lapersonne, who called general attention to this affection after discovering by microscopic examination that a tumor supposed to be a sarcoma of the orbit was in reality a tuberculous lachrymal gland. About the same time, L. Müller described two cases of primary tuberculosis of the gland, in which he succeeded in finding the bacillus. Later Baas reported two cases and Salzer one.

The history of our case is as follows: A servant girl, aged twenty-one, had noticed for two years and a half the development of a growth in the region of the left upper lid, which recently has been stationary. Otherwise the patient is healthy.

June 25, 1895, the region of the left upper lid projects forward in its entire lateral extent, and from the tarsus to the brow. In the middle portion of the swelling is a red spot where dilated blood-vessels in the skin and subcutaneous cellular tissue show through. The palpebral fissure is only 5 mm wide in the middle in this eye, while it is 9 mm wide in the other. On palpation the

tumor feels quite soft, but from it a denser mass extends back into the orbit. The movements of the eye are normal, and the ball is intact. A great number of the cervical and inguinal glands are slightly enlarged. The preauricular are considerably swollen.

June 28th, the tumor and the preauricular glands were removed by operation. An incision was made through the entire length of the upper lid, midway between the brow and the lid margin, and the neoplasm with its pedicle extending deep into the orbit was dissected out entire. The neoplasm was of kidney shape, 3 *cm* long and 1 *cm* broad at its broadest point. The surface was fairly smooth with a few constrictions, and of moderate hardness. The preauricular glands were removed entire and presented the same characteristics.

Sections stained with hematoxylin revealed chiefly at the margin well preserved glandular tissue—transverse sections of gland ducts with normal epithelium, and longitudinal sections of ducts and acini. Evidently these structures belonged to the lachrymal gland, but they were confined to a small area. Where the disease begins first, the interacinous connective tissue is more or less infiltrated with round cells; these soon become so numerous that they push the remaining glandular elements far apart. The round cells also wander into the glandular structures and pass between the epithelial cells and into the ducts. Gradually they occupy the entire space and the glandular tissue has disappeared. In general, the round cells were present in such numbers and so regularly distributed that the picture of sarcoma was suggested, but here and there were typical submiliary tubercles. Some of these were exclusively epithelioid while in others round cells were present in such number that the tubercles presented a lymphoid structure. Many giant cells were present, and in these were found tubercle bacilli in considerable number.

The preauricular glands showed the same tuberculous character. One portion of the tissue removed appeared to have belonged to the parotid gland, the disease having extended to this through the lymphatics.

We may say as to the clinical picture of tuberculosis of the lachrymal gland, that there appears a dense tumor sometimes as hard as cartilage, about the size of an almond, freely movable and not adherent to the overlying skin, lying in the temporal portion of the upper part of the orbit. Usually

the limits of the tumor posteriorly cannot be determined. In three cases its development has been rapid, *i. e.*, within 2-3 months, in three it has required 3-4 years. In only one case was there pain at the beginning. The tumor is not sensitive to pressure. The overlying skin was red and swollen in three cases.

In five cases there was tuberculosis elsewhere, or at least suspicion of tuberculosis, and in only one was there not even an hereditary disposition. Excepting slight disturbances of mobility the eyeball has been normal. Microscopically there have been found the typical changes of miliary and submiliary tubercles with more or less round-celled infiltration. Actual caseation was not found, but the vitality of the cells composing the centre of the tubercles was often low.

XIX.—A CASE OF BILATERAL AND NON-INFLAMMATORY
GLAUCOMA IN EARLY LIFE ASSOCIATED WITH
RETINITIS PIGMENTOSA AND MYOPIA.

BY DR. HEINERSDORFF, ELBERFELD.

(FROM THE UNIVERSITY EYE CLINIC AT BERNE.)

In these ARCHIVES, vol. xxvii., p. 53, German edition, Bellarminoff described a case of retinitis pigmentosa complicated with glaucoma. I have been able to find but four other cases recorded, and on account of their rarity I present the following case:

R. M., aged twenty-two, has since early youth suffered with night blindness and poor vision in the distance. Lately he has noticed that his vision is growing poorer and that his visual fields are smaller. In the last four or five months there has been a cloud before his eyes which has hindered him at his work—that of a clerk.

Three years before, the patient had been examined in our clinic, when a considerable concentric contraction of the visual fields had been found and a diagnosis of retinitis pigmentosa made.

April 17, 1895, the patient appeared healthy, although there were traces of albumen in the urine and a few hyaline casts. Myopia 6 D in each eye, anterior chambers shallow, media clear,

T + 2 in both eyes, R V = 0.45 with - 6 D, L V = movements of the hand excentrically. R, great concentric contraction of the field. Ophthalmoscopically, both discs grayish-white and excavated up to the margin. The vessels are few and very narrow, and can be followed only a short distance from the disc. The middle zone of the fundus exhibits the typical pigmentation of retinitis pigmentosa. [The colored plate in the German edition, though pretty, is omitted, as it shows nothing new ; also the cases are not so very rare. H. K.]

Eserine one per cent. was tried without result. An anterior sclerotomy was made in the right eye. The tension rose again after this, but was controlled by one per cent. pilocarpine in vaseline, which acted much better than the simple solution. The vision in the right eye was a little less after the operation than before, but a year later no further disease had occurred. A posterior sclerotomy was done in the left eye.

XXI.—PURULENT KERATITIS IN MAN. A BACTERIOLOGICAL AND CLINICAL STUDY.

BY DRS. L. BACH AND R. NEUMANN, WÜRZBURG.

This paper contains the results of the examination of thirty-two cases of corneal ulcer. The results agree with those of Gasparrini, published in 1893, and those of Uhthoff and Axenfeld, published later, as to the fact that serpent ulcer of the cornea is usually due to the pneumococcus.

REPORT ON THE PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY AT THE ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION, AT PORTSMOUTH, AUGUST, 1899.

By W. J. LISTER, Esq.

AUGUST 2D., THE PRESIDENT OF THE SECTION, SIMEON SNELL,
F.R.C.S. ED., PROFESSOR OF OPHTHALMOLOGY, UNIVERSITY
COLLEGE, SHEFFIELD, IN THE CHAIR.

**On the Prevention of Eye Accidents Occasioned by
Some Trades.**

Of the opening address by the President, the MS. of which was kindly put at our disposal, we give an elaborate abstract on account of its high practical value.

After a few introductory remarks Mr. SNELL said :

I desire to ask your kind attention for a short time to some remarks on the causation and prevention of eye accidents in certain trades. Practically my whole professional life has been spent in a very populous district, well known for its extensive iron and steel works, for its cutlery, and for a number of metal and other trades, and also as the centre of a very extensive coal-field.

Magnus in his tables gives 8.5 per cent. of all cases of blindness as due to accident. Those blind in one eye only and the far larger number who have sustained permanent injury in varying degrees short of blindness are excluded in such a calculation, and, however true such a statement may be for the community generally, it must be largely exceeded in large and populous centres, especially those in which iron and steel are important industries.

Mr. Watson, the able secretary of the Miners' Permanent Benefit Fund has given me the following statistics as to the proportionate frequency of eye accidents among miners to other accidents.

Period.	No. of accidents.	No. to eye.	Percentages.
1884 to 1888	16,870	857	5.08
1889 to 1893	12,768	670	5.24
1894 to 1898	18,624	979	5.25
Total . . .	48,262	2506	5.19

The average yearly membership, for each period, was, 1884 to 1888, 22,410; 1889 to 1893, 17,876; and 1894 to 1898, 23,005.

In all these accidents the miners have been rendered unfit for continuing their work, at least temporarily. The figures are for fifteen years arranged in periods of five years. It is curious to see the proportion 5 per cent. coming out practically the same for each period. The number of non-fatal accidents dealt with is 48,262.

The Equalized Druids' Society, embracing all classes of workmen, gives to its members who are permanently incapacitated from following their employment a grant of £100. The number of cases of all accidents in which this grant has been made during the last five years is fifty-seven, and out of that number the recipient has obtained it seven times owing to eye accidents.

Of the last 2546 patients who have passed through my wards (ophthalmic) at the Sheffield Royal Infirmary 2038 were men, and 516 women. Of the 2038 men, 622 were admitted for accident, or 30.4 per cent. Of the 516 women, only 36 were admitted for accident, or 6.9 per cent.

In many trades associated with iron and steel in all its varieties, small foreign bodies are very prone to become lodged in the workmen's cornea. I take as an example the grinders. In the course of the day a grinder may get several foreign bodies fixed in his cornea, or days may elapse without such a mishap. "Mote" is the name popularly given by the workmen to these particles in their eyes. If the cornea of a grinder be carefully examined with a magnifying glass it will not infrequently found to be studded over with minute *nebulæ*. Though, therefore, the damage done by each "mote" may often not be serious, yet the frequent repetition, by dulling the cornea, will, in many cases, diminish the acuteness of vision. These particles may either be small fragments of stone, or, much more frequently, small portions of steel,

or emery, which last is largely used as a wheel for glazing cutlery, and for other purposes.

A few observations about the grinders' work will be of interest. I take works where, at the time of my visit, besides outworkers, seven hundred men were engaged in making pocket-knives, razors, etc. Of the two varieties of grinding, it was at once evident that the dry-grinders were more exposed to injury from foreign bodies than the wet-grinders. A grinder sits across his bench, which he calls his "horse," and presses the knife or razor blade on the stone. The wet prevents the particles flying about a good deal, but a man's face becomes, as he works, bespattered; nevertheless a wet-grinder would say that, compared with the dry-grinder, he seldom gets motes in his eye. In dry-grinding the sparks fly freely, and it is evident that particles, very minute, of steel or stone, are being projected about, and it is the merest chance whether they hit the man's eye or face, or scatter about the room. There can be no question that the grinder derives considerable immunity from these "motes" by the employment of protective glasses. Several grinders whose ocular condition necessitated the wearing of spectacles have admitted the protection they afforded. If further testimony were needed, it can be found in the condition of the glasses after use for some time by a grinder. This suggests the proper correction of errors of refraction by spectacles.¹

It must be admitted that in the great majority of instances the damage occasioned to the grinder or other operative to whom such mishaps occur is not attended with serious results. To many, however, the immediate injury is serious, either *directly* or by the *ulceration* that ensues.

In the various trades in which steel and iron are used, the operatives are liable, though to a less degree than the grinder, to get these motes into their eyes. Many workmen are skilful in removing motes from their comrades' eyes. In all the large works there are men who have a reputation in this way. It is, besides, not an infrequent sight even in the streets to see a man with his head against a wall and a fellow-workman endeavoring to remove a foreign body from his eye. The number of foreign bodies

¹ After a time, in grinding blades, a stone gets blunted, its pores becoming filled up with portions of hard steel. A process is then adopted for "cleaning" or "sharpening" the stone, and it is more than usually dangerous, because it liberates these particles as well as makes fresh ones.

some of these men remove in the course of a day is very large. One man, a timekeeper at works where one thousand men, besides outworkers, were employed, told me he had for fifteen years at least been recognized as a skilful remover of motes. Sometimes he has extracted a score or more a day ; sometimes the number was much less, but he had not for many years passed a day without at least one case. He was not the only man with a reputation at these works, for grinders and others also removed motes. He used a lancet with the end blunted. It was quite clean, and he kept it so by either putting it on a strop or wet stone. For the same purpose other men would use a lancet, pocket-knife blade, or even a pin, etc. The knife would, very possibly, be the same used at the man's lunch, and the pin, not infrequently, is put into the mouth to wet it before being used, and is very likely kept stuck in the man's waistcoat, where it comes in contact with the dirt collected in the clothing.

Without doubt in many instances these motes are skilfully removed, in others there is a good deal of bungling. The instruments generally used are unsuitable. Not infrequently cases come under observation in which sloughing corneal ulcers have resulted from the efforts made to remove a mote. It seemed to me not unlikely that a septic condition was set up in consequence of the uncleanly instruments which were so often employed. Dr. Shennan, of Edinburgh, kindly undertook a bacteriological examination of some of these instruments for me. I collected twenty-two tools used by different men ; seventeen of these were got together for me by the skilful timekeeper I have already mentioned, the other five were obtained at large engine works. Some of the tools were fairly clean, but others were in a dirty state ; two or three were magnetic. Dr. Shennan examined the majority of these tools. Taking all in all, he found nothing pathogenic excepting the staphylococcus pyogenes albus, whose virulence is comparatively slight. The other organisms found were chiefly sarcinæ of the more common varieties, and bacilli of the "subtilis" (Hay bacillus) group. He failed to obtain cultures from one only of the instruments, and the greatest number of separate colonies were obtained from a common white pin. The presence of organisms had apparently no special relation to the cleanness or rustiness of the tools. They were present on the brightest steel, whereas the instrument from which he failed to obtain cultures was a lancet, the blade of which was slightly but decidedly

rusty. Still, as he remarks, one cannot lay much stress on such an occurrence, as it might be accidental.

By far the most serious eye accidents happen to men engaged in working iron or steel. The following figures exhibit this in a very lucid light. Out of this total of 359 eye accidents to males, taken from the records for this purpose consecutively, which were so serious as to require admission to my wards at the Sheffield Royal Infirmary, no fewer than 173 were caused by iron or steel. There were also 43 due to burns from molten metal, sparks, flashes, etc.

The opportunity for the infliction of severe injuries to iron and steel workers is multitudinous. They occur in all branches of the trade, in the lighter iron and steel industries, as well as in the heavy trades where armor plates are made and heavy castings of scores of tons. A very large proportion of the accidents are occasioned by what is called "chipping" and "fettling." Dressing is the name given in some parts to this process. This work consists in chipping the rough edges from steel and iron castings, ingots, and all kinds of iron and steel work and, among other things, even the large armor plates. Whatever be the special kind of metal or steel to be fettled, the manner in which it is done is practically the same. A hammer and chisel or sate are used, and with these the roughnesses are removed. I understand that at works where, say, a thousand men are employed, two hundred or more would be occupied more or less in "chipping." Many men are frequently working close to each other, so that the danger is not only to the worker himself, but to those around. Passers-by are by no means infrequently the victims, and many blinded in this way have come under my notice. The chipper himself is often hit by the rebound of the splinter after it has struck perhaps the narrow angle of steel or iron upon which he may have been working or some other object. It must be recollected, also, that in the process spoken of, the danger is not merely from the iron or steel which is being operated upon, but there are three other places from which splinters may be, and actually are, given off and cause injury, viz., the hammer head, the chisel head, and the chisel point.

The sizes of the splinters spoken of vary from the most minute to others measuring some inches in length and may be thick or thin. The injury inflicted varies, of course, in accordance

with the size of the missile and the force with which it is projected. The small fragments may be thrown off with such velocity that they penetrate the eyeball and become embedded in its interior, in some instances passing through the eyelid before reaching the globe. The destruction to sight in this way is very large. I have, myself, removed from the globe, with the electro-magnet, I believe, more than 200 fragments of steel and iron, mostly projected into the eye in the manner I have just described. I have arranged in a case, for your inspection, 117 of these splinters. Though all are comparatively small, there is a great variety in size. One is no heavier than .0015 grain, the largest weighs 36 grains. This is not the place to refer to the results of the extraction of this number of foreign bodies with the electro-magnet, and I content myself with saying that many eyes have been saved by its employment which otherwise would have been hopelessly lost.

It has been my sad fortune on more than one occasion to have a workman under treatment in consequence of a severe injury caused by a large or small splinter of steel or iron and in which loss of sight has resulted, who has, afterwards, returned to his work and has again come under my care with a similarly disastrous accident to the remaining eye. In one instance, which I well remember, a very few weeks only had elapsed between the two accidents.

Besides the manner of arranging the men to prevent injuries, it is fortunate that the dangers of chipping may be avoided by adopting a pneumatic chipper.

I visited one of the works, where I saw the pneumatic chipper at work on a large casting. It has the advantage of accomplishing in one hour what, by hand, would take six or seven hours. It certainly prevents the flying about of splinters in a remarkable manner. It is more like using a cheese scoop in a fairly soft cheese than running any tool over hard steel.

Another class of severe injuries which are of common occurrence are *burns from molten metal*. Sparks and flashes fly about freely in almost every instance that molten metal is run into the moulds, but in some, of course, more so than in others, and the portions given off vary much in size. Injuries caused in this manner were no fewer than 43 out of the 359 consecutive accidents in males admitted to the Royal Infirmary under my care. In the forgings also, great or small, when the iron or steel is being

hammered either by hand or, in the case of larger castings, by a steam or hydraulic hammer, portions are given off the glowing metal, and those working, and the bystanders, are exposed to danger of burns. Injuries inflicted by molten metal are very serious owing to the immediate destruction of tissues or the later results.

The knowledge which I have acquired from contact with working men that have been injured, and visits from time to time to many of the principal works, has long since satisfied me that much of the destructive injury to sight, which is constantly coming under one's observation, is preventable, and that means can, and should, be adopted to endeavor to lessen the risks to sight which are at present associated with such important industries. My experience has shown me that there is less difficulty in enlisting the support of the employers than the assent of the men to adopt precautionary measures. With the Compensation Act in force, I have no doubt that the assistance of the masters will even be stimulated. It only recently came to my knowledge that one firm had made it compulsory on men engaged in "chipping, fettling, turning," and other work in which iron and steel splinters were liable to fly off and endanger sight, to wear protectors, which were provided at the expense of the firm. This decision was taken in consequence of a workman being blinded by a chipping, and it is easy to see, while creditable to their humanity, how such a course, if it tends to prevent loss of sight, is likely to be a pecuniary saving.

In considering what kind of protectors men should use certain points must be borne in mind. The cost must be moderate, and any covering over the eyes should interfere with sight as little as possible, if at all. Among iron workers glass is practically out of the question. Even thick rock crystal, which has been suggested for some kinds of work, in consequence of its thickness and peculiar manner of fracture, would hardly do. There are a great variety of protectors in the market, but they have been little used. Gauze wire, fitting close to the eye like a cup, and attached to the head by a string, is employed by stone breakers and in some iron-works. They complain of them as being hot and interfering with sight, but there is no question that such protectors afford considerable immunity from accident. Another practical point about protectors is that they should not be liable to rust. For this reason galvanized iron wire or, better, aluminium wire is of ser-

vice. The mesh should be strong and fine and sufficiently close to prevent, as far as possible, even small chippings passing through it, and yet to interfere with sight as little as need be. I have supplied workmen with such protectors, who have used them for chipping, steel melting, and other dangerous iron and steel work. I learn that they answer their purpose well as protectors, and that the interference with sight is very little, not greater than that occasioned by many ladies' veils.

I would sum up my suggestions as to the means for protection as follows :

1. The grinder will find that large glasses made of plain glass, or indeed his own spectacles, should his refraction require their use, will afford great protection. Or he may use other protectors made with glass in front and gauze surrounding it.

2. The use of protectors should be compulsory for those workers in iron and steel whose employment renders them liable to be injured by splinters or who are exposed to dangers from molten metal.

A gauze eye-shield will, I believe, answer the purpose well. The cost is low, and it is worth the employers' while to supply their men with them. Other means to be adopted are :

(a) The use of a pneumatic chipper whenever practicable ; (b) the proper arranging of the men at their work ; and (c) the use of screens so as to avoid injury to their fellow-workmen and to passers-by.

W. F. RICHARDSON CROSS read a paper on **the pathological significance of sympathetic irritation and its connection, if any, with sympathetic ophthalmitis.**

He described the symptoms of the two conditions and the variability of the period after the injury at which they occurred. He enumerated the injuries and the consequent conditions of the exciting eye liable to set up sympathetic irritation and ophthalmitis and noted the uncertainty of foretelling whether an injured eye will set up sympathetic mischief or not.

After discussing the various theories of the pathology, he concluded that though suggestive they still remained unproven. Very little opportunity had so far been obtained of studying the pathology of sympathetic irritation, and at present the old theory that the irritation is due to a reflex neurosis is the one usually held. In some cases the affection would appear to be due to the presence of organisms in the sympathizing eye, which for the

time being are capable of setting up irritation only, but are liable at any time later on to give rise to inflammation.

Apparently irritation leaves a permanent damage to the eye in some instances. Brailey quotes 29 cases where enucleation of the exciting eye was performed to relieve sympathetic irritation : in 16 of the 29 cases the latter was cured, in 13 it was uninfluenced or rendered worse. Mr. Cross asks why, if the irritation be a pure neurosis, were not all the cases cured by removal of the cause?

Irritation may go on for years without the occurrence of inflammation or it may last only a few days before inflammation follows it. He thinks that the temporary irritation which seems to culminate in inflammation appears to be different in its causation from that which occurs independently.

He advises that synechia and cicatricial traction or pressure should be relieved if practicable ; but that great efforts should not be made to retain blind and dangerous eyes. An eye that is neither comely nor useful, and which is in any degree a possible source of mischief to its fellow, should be enucleated.

In the discussion which followed, Dr. LANDOLT agreed with Mr. Cross that a lost and dangerous eye should be removed. He had never followed the proposals put forward to save the healthy eye in place of enucleation, such as resection of the optic or ciliary nerves, subconjunctival injections of antiseptics, etc. He had lately seen a case where after penetration of one eye by a foreign body, in spite of subconjunctival injections of sublimate, the injured eye became severely inflamed and gradually shrunk, while the other showed marked signs of sympathetic ophthalmitis, the further development of which was stopped by removal of the exciting eye.

Mr. MACHARDY said he was glad to find such unanimity of opinion as to the advisability of removal of any eye blinded by injury. He was reminded of the advice of Sir William Bowman, that when enucleation in these cases had been recommended it should not be stated as necessary to the salvation of the sight of the fellow eye, since the period which elapses between the injury and the inflammation in the sympathizing eye might be three weeks or forty years, and each year of postponement tends to damage the patient's estimate of the oculist.

Surgeon-General COLEY mentioned a case of sympathetic irritation coming on seventeen years after injury, and which quickly

subsided after removal of the injured eye. He thought that the attack must have been due to neurotic influence and not to direct microbic or other inflammation spreading from the injured eye.

Dr. DE SCHWEINITZ agreed with Mr. Cross and Dr. Landolt in their treatment of dangerous eyes, and maintained that sympathetic irritation and sympathetic ophthalmitis should be regarded as separate diseases, each with its own pathology. He concluded with a plea for a more thorough examination of patients with sympathetic ophthalmitis, an examination of the leucocytes, the range of temperature, etc., and suggested that information thus gained might be a factor in the differential diagnosis.

Dr. REEVE mentioned a case of sympathetic irritation which had lasted for fifteen years, and where complete recovery followed Mules's evisceration.

Dr. BRONNER related a case of sympathetic ophthalmitis following a blow, which caused dislocation of the lens and hemorrhage into the vitreous but without external wound. In three weeks sympathetic inflammation started in the other eye, of which keratitis punctata and papillitis were the chief symptoms.

Mr. CROSS in reply thanked the visitors and members for their valuable experience.

Dr. LODGE recounted some cases which he had **operated upon for high myopia** with good results.

Mr. RICHARDSON CROSS thought that no one who had done the operation would be likely to give it up, as the results were so satisfactory.

Mr. BRONNER read a paper on the use of **homatropine in some cases of muscular asthenopia**, where the use of correcting glasses, spherical, cylindrical, or prismatic, did not relieve the pain. The orthodox treatment was to order atropine drops, which prevented the patient from following his usual occupation for some weeks. In many of these cases the use of a 1% solution of homatropine hydrobromate once or twice at bedtime for a week or two relieved the symptoms.

August 3d.

Mr. SIMEON SNELL, in the Chair.

Mr. E. TREACHER COLLINS read a paper on **enophthalmos**, and illustrated it with a number of lantern slides showing photographs of a series of cases that he had met with, in which it was

present. He divided the cases into non-traumatic and traumatic. Amongst the former he described cases in which the sinking of the eye was associated with other symptoms of paresis and paralysis of the cervical sympathetic such as morphæa and analgesia in the course of the fifth nerve. Also a case where the enophthalmos became converted into exophthalmos when the patient stooped or had his jugular vein compressed, and a case where the backward displacement of the eye was congenital and associated with congenitally defective movements of the eye.

He detailed five traumatic cases in three of which there were extensive scars at the margins of the orbit. In one of the others the enophthalmos had followed a blow on the cheek of the opposite side.

In two of the five cases there was anæsthesia of the face and brow of the affected side.

He compared the cases with the various theories which have been put forward to account for traumatic enophthalmos, and though he thought it unnecessary to assume that in all traumatic cases the backward displacement of the globe was produced in the same way, he considered that his five cases were best explained by the theory of Gessner, which attributed it to the contraction of inflammatory products the result of orbital cellulitis.

In the two cases in which there was no external scar, he thought the cellulitis might have resulted from a communication of the orbit with one of the neighboring air sinuses through fracture of its walls.

Deputy-Surgeon-General CAYLEY opened a discussion on **the visual tests employed in the army and navy and mercantile marine, and their efficiency**. In his paper he said that the efficiency of the men in the services depends on their eyesight being up to a certain standard. The standard of normal vision is unattainable, and men must be taken whose vision, though below normal, is up to a certain standard of practical fitness.

I.—BRITISH ARMY :

(a) *Recruits*—The test for recruits is that they shall see distinctly and count Snellen's dots $\frac{1}{4}$ inch in diam. at 10 feet. This is equivalent to seeing the 3-foot bull's-eye at six hundred yards. This minimum standard is equal to $\frac{1}{4}$ of normal sight and represents myopia of about 1.75 D. For the militia and the departments the standard is only half the above.

It is a question whether a man whose eyesight comes up only to the minimum standard is fit for service with modern long-range rifles. Defects of vision due to myopia are greatly exaggerated by conditions of fog, smoke, etc.

(b) *Commissioned Officers*—including the R. A. M. C. and the Indian medical service.

For the minimum standard the candidate must read clearly with each eye and without glasses $D = 24$ at 6 metres, and small type $D = 0.8$, and with correcting lenses must be able to read $\frac{6}{8}$ with one eye and at least $\frac{6}{12}$ with the other. He must also be able to distinguish the principal colors.

This minimum would admit of myopia $= 1.75 D$ to $2 D$. The tests employed are chiefly against myopia, and a candidate may have a considerable degree of hypermetropia. This for all out-of-door work is a less serious defect than myopia. In our army the objections to the use of glasses are very great.

The present visual standard ensures fairly useful sight both to men and officers, but it could not be safely diminished. The complaint is sometimes made that candidates, after all the labor and expense of a competitive examination, are rejected on account of defective sight. This is seldom a real ground of complaint, as the candidates are recommended before commencing study to undergo a medical examination. In doubtful cases they almost always have due warning, and if they then decide to go up it is with full knowledge of the risk of not being passed as fit. Visual tests, like other tests of physical fitness, may sometimes cause rejection of otherwise good men, but eyesight in the army is of the utmost importance, and, as a rule, men with good sight are in other respects quite as good as those with defective sight, and often better, because their powers of observation are less limited.

II.—ROYAL NAVY :

By the Queen's regulations normal vision and normal color-sense are required for all classes, but much latitude is given to the medical examiners, and in practice a certain degree of ametropia is allowed, not only for departments, but also for ordinary seamen. It would be better if a definite standard were laid down and vision tests employed, but as the examinations are made by competent medical officers no doubt the present system works well.

For naval cadets and for engineer apprentices, normal vision

and full color vision are insisted on, the examinations being conducted by a special committee of medical officers.

III.—MERCANTILE MARINE :

For ordinary seamen and boys, no special vision tests are employed and the eyesight is not examined. This is a dangerous omission which needs the attention of the Board of Trade. Some large private shipping companies have their own rules and tests, and in some, as the White Star Line, special men are examined, selected, and paid as look-out men on every ship.

For certificated officers, apprentices, and for boys from the training ships, the tests are that he must read Snellen's test types (old edition, not the metrical) No. XL. at 16 feet. This gives a minimum vision = $\frac{1}{3}$ or $\frac{2}{5}$. If unable to read, test dots may be used.

Color sense is tested by Holmgren's colored wools. These examinations are held locally and not conducted by competent medical men and often give rise to great dissatisfaction—indeed men who have failed before the local committee have been pronounced fit on appeal to the central examining board, and probably it often happens that men passed as fit have defective sight. Unskilled examiners cannot, with any reasonable probability, exactness, or fairness, conduct visual examinations. The whole system of the standards and tests of eyesight both for officers and men of the mercantile marine is utterly defective and requires to be put upon a sound footing.

For the pilot service, as a rule, no standard of sight is required ; in a few localities a superficial examination is made. It is hardly credible that men may be certified and registered as pilots, who have defective vision and are color-blind.

For the various Indian services, definite rules are laid down.

For the civil service, any degree of ametropia is allowed, provided with a suitable lens $V = \frac{5}{6}$ in one eye and at least $\frac{5}{6}$ in the other, and that there are no active morbid changes in the fundus.

For the Indian pilot service, normal vision and full color perception are required.

With regard to the *quickness* of sight required in the case of signallers, an interesting paper on the subject was read lately by Mr. Stewart Bruce at the United Service Institution. Of men selected for the signalling classes only about 15 per cent. have sufficient quickness of sight to enable them to become efficient

signallers. Very many are good enough for slow signals but quite fail to see quick signals, at the rate of twelve or more words a minute, for which the retina has to receive and distinguish some two hundred impressions a minute. Mr. Bruce has invented an optical instrument, the "Aërial Graphoscope," for measuring the duration and persistence of retinal impressions.

Mr. T. H. BICKERTON read a paper on **color-blindness and defective vision in the mercantile marine**. Do the Board of Trade Regulations exclude the color-blind and nautically blind from the sea service?

He points out that from the Board of Trade reports, since 1877, when color tests were established, till 1898, 100,984 individuals have been tested for colors and 913 have been detected as color-blind, but there is no evidence whatever to show that these men have abandoned sea life, nor is there any provision made in the Board of Trade regulations to compel them to do so. At the present moment and under present regulations color-blind boys, "look-outs," and A. B.'s are competent to assist in the navigation of ships, and may remain in the sea profession to the end of their days; while color-blind officers who escaped detection by the old test—the *naming of colors*, established in 1877, rescinded in favor of the new test, the *matching of colors* in 1894,—and color-blind officers with endorsed certificates, are allowed to accept any engagement they can obtain either as officers or in any other capacity.

The fact that color-blind men do continue to follow sea life was so positively proved in evidence that the first two recommendations of the Royal Society's committee, appointed by the government to inquire into the whole question, were directed to their compulsory exclusion—viz.:

"(1) That the Board of Trade or some other central authority should schedule certain employments in the mercantile marine and on railways, the filling of which by persons whose vision is defective either for color or form, or who are ignorant of the names of colors, would involve danger to life and property.

"(2) That the proper testing, both for color and form, of all candidates for such employments should be compulsory."

Neither of these two recommendations have been acted upon by the Board of Trade.

The last recommendation was directed to their after-detection in case they continued to follow sea life.

“(3) That in case of judicial inquiries as to collisions or accidents, witnesses giving evidence as to the nature or position of colored signals or lights should themselves be tested for color and form vision.”

As regards this last recommendation the Board of Trade writes, in answer to a letter from Mr. Bickerton, that “they are not aware of any instance in which a court hearing a collision case has considered it necessary to have witnesses tested for eyesight or color-blindness.”

He gives a long list of grounds for believing that defective sight and color-blindness have accounted for, and will account for, shipping disasters.

Dr. GEORGE MACKAY wrote a paper pointing out **the defects in the examination of eyesight in the army, navy, and mercantile marines.** He quoted cases which had come under his own notice of hypermetropes of high degree admitted into the army and navy who, with advancing age, have become unfitted for their work.

He also considered that many excellent handicraftsmen are lost to the services by the unreasoning adherence to the hard-and-fast eyesight standards at present employed,—men who might be advantageously admitted if a careful consideration were made of the particular duties they had to perform, and the probable fitness of their eyes and the stability of their refraction in relation to those duties. If this were done there would not be so much difficulty in getting recruits. He censured strongly the action of the Board of Trade in using fallacious color tests, employing incompetent lay examiners, and neglecting to apply the sight tests early enough.

The committee of the British Medical Association for the better control of mariners' eyesight, in its report to the council of the Association, recommends that a representation should again be made to the Board of Trade, urging it (1) to entrust its eyesight examinations to medical men holding a certificate of proficiency, and (2) to insist on every apprentice passing an eyesight examination at the outset of his career.

A resolution was carried at a meeting of the Ophthalmological Society of the United Kingdom, January, 1895, that “no examination of eyesight is fair or satisfactory which depends merely upon the examination of form of vision by test types and dots, and *omits* an estimation of the refraction.” He suggested as a

key to the problem that a few appointments be offered to well-trained junior surgeons to act as inspectors of eyesight who could train up a set of officers well fitted to advise the authorities on various points, such as (1) the best tests to employ ; (2) the standards of vision demanded by various duties ; (3) the propriety of permitting the wearing of glasses in certain circumstances.

Mr. MALCOLM MACHARDY severely criticised the eyesight examination of Royal Naval cadet candidates. He considered it to be mischievous and unfair, in that (a) it fails to exclude candidates with focus errors, even when such focus errors are calculated subsequently to impair the efficiency of the sight, and (b) it leads to the final rejection, on account of transitory visual imperfections, of candidates who have perfectly focused eyes and trustworthy acuteness of vision.

Lieut.-Col. E. F. DRAKE BROCKMAN considered that the standard of vision for recruits is below what it should be.

Mr. RICHARDSON CROSS said that the testing of the sight for the services should be made under absolutely fair conditions, and especially that the illumination of the test types should be constant, of a standard candle-power.

He thought that any line of passenger ships which, in addition to other recommendations, could add that the sight of its officers and men was fully assured by occasional examinations by a competent oculist, would increase largely its popularity, and other lines would have to follow suit in competition.

Dr. LANDOLT introduced *a new test type*.

It is arranged on the universally adopted principle of determining the smallest angle subtending two points, which the eye can distinguish as separate. One figure only is used, drawn in different sizes, viz., a black circle, with a gap at one part of the circumference, drawn on a white ground. The gap is in a different position in the various circles, and its size is such that for the unit of acuteness of vision, it subtends an angle of one minute. The smallest circle in which the position of the gap can be distinguished will be a measure of the acuteness of vision.

The use of a single figure is preferable to that of different letters, which vary in their legibility ; it is suitable for the literate and illiterate alike, and for persons of different nationalities, also for being observed directly or through a mirror. The figures are arranged on a square sheet, which can be more equally illuminated than the usual oblong test type.

Mr. JOHN GRIFFITH read the notes of a case of **primary sarcoma of the fornix conjunctivæ**.

Dr. JAMES HINSHELWOOD read a paper on the **use of euphthalmin, new mydriatic**.

Euphthalmin produces a maximum dilatation of the pupil, while the accommodation is only very slightly affected. It causes no smarting or discomfort, it has no appreciable effect on the conjunctival vessels or corneal epithelium, the tension of the eye is not raised, nor have any toxic symptoms been observed from its use.

Dr. Hinshelwood uses a 5 % solution and instils it three times at intervals of two minutes. The maximum dilatation of the pupil is obtained in from 20 to 30 minutes, and passes off in from 8 to 12 hours. If a drop of a 1 % solution of holocain be instilled previous to the euphthalmin, the maximum effect is obtained in 15 to 20 minutes, which is the same time taken by a 1 % solution of homatropin. On the other hand, the effect on the accommodation is very slight and disappears in $1\frac{1}{2}$ to 2 hours, whereas that due to homatropin lasts from 12 to 24 hours.

Mr. WATSON GRIFFIN read the notes of cases showing **the value of correcting hyperphoria, even though it be very slight in amount**. In three of his cases a prism of $\frac{1}{2}^{\circ}$ or $\frac{3}{4}^{\circ}$ was sufficient to relieve the asthenopic symptoms.

Dr. KENNETH SCOTT described a case of very extensive **destructive ulceration of the eyelids**, which was cured by anti-syphilitic treatment.

Dr. G. J. BULL (Paris) wrote a paper on the **use of the stereoscope—to determine, in cases of inefficiency of the ocular muscles, the degree of ease or difficulty with which binocular vision is obtained**.

Dr. HERN wrote a paper describing **some of the ocular symptoms in hay fever**.

Mr. ARNOLD LAWSON wrote a paper on the **correction of refractive errors in the treatment of trachoma**.

He gave the notes of two of his cases, in which the ordinary treatment for trachoma had been carried out for long periods without benefit—including the wearing of protective glasses. On correcting the high degree of ametropia—H., M., or Ast.—which coexisted, the improvement was very marked.

REPORT OF THE PROCEEDINGS OF THE NINTH
INTERNATIONAL OPHTHALMOLOGICAL CON-
GRESS, UTRECHT, AUGUST 14-18, 1899.

BY PROF. R. GREEFF, BERLIN.

Translated by Dr. WARD A. HOLDEN.

The congress was opened at a general session in the aula of the university with addresses by A. Robertson, president of the preceding congress, and Snellen, president of the present congress. On account of the quantity of scientific material offered it was decided to divide the proceedings into three sections :

Section A, of anatomy and demonstrations.

Section B, of biology and optics.

Section C, of clinical and therapeutical communications.

This arrangement, although it saved a great deal of time, was, in the opinion of most of those attending, unsatisfactory. It was too difficult to select the papers in which one was most interested and, furthermore, the continual running back and forth was disturbing. It would probably be better in the future to arrange the papers according to subjects instead of allowing them to be read in the order in which the titles are sent in.

Otherwise everything was well arranged and none who took part will forget the pleasant days spent in hospitable Holland. The congress was well attended by oculists from all parts of the world.

AUGUST 15TH.

GENERAL SESSION.

PRIESTLEY SMITH (Birmingham) : **The treatment of squint in children.**

The author had studied 576 cases of squint and was able in 347 cases to determine the time at which the squint began. He con-

cludes that it begins usually at a very early age and therefore the treatment is usually undertaken too late. The results are better the earlier treatment is begun. In most of his cases the children began to squint in the third year. In 68 per cent. of all cases treatment was begun a year or more after the first symptoms appeared. This disposition to wait in cases of squint is explained by the fact that many cases recover spontaneously and by the generally accepted idea that an operation is always required.

Loss of fixation is only found in unilateral constant squint. It appeared 250 times—*i. e.*, in nearly one half of all cases there was false fixation. This is found especially in those cases which came on in the first two years of life and is rarer in cases developing later. It is almost constantly absent in cases developing after the sixth year. Loss of normal fixation is therefore a secondary and not a primary symptom. Normal fixation develops in the first year of life, and is lost the more readily the shorter time it has existed. The amblyopia is probably associated with the imperfect development of the faculty of vision in the squinting eye. This matter is hard to determine, however, since we cannot measure the vision of the new-born.

In 96 patients orthoptic treatment was undertaken before the fourth year. It cannot be denied that covering the non-squinting eye is often of great benefit. Among the patients with false fixation 5 regained normal fixation after wearing correcting glasses. In one of these children complete binocular vision had been gained. The older the patient the more difficult is it to restore normal fixation. The treatment therefore must be begun early.

SESSION OF SECTION A.

EINTHOVEN : Geometrico-optical illusions.

The author spoke of his investigations in this matter which had already been published. He explained the illusions by the seeing in diffusion circles. When these illusions are projected in diffusion circles the figures are actually changed in the way in which we believe we see them.

Discussion.—SCHOUTE.: I have studied the effect on the Müller-Lyer illusions of moving the eyes and have come to conclusions agreeing with Einthoven's theory. But when I direct my gaze about the figure the illusion is somewhat more marked than when I fix my gaze on the middle point of the figure, while

Einthoven regards movement of the eyes as a factor tending to lessen the illusion.

NUEL: The channels of elimination of the aqueous from the anterior chamber.

The author injected some drops of India ink in the vitreous of living animals and examined the eyes at varying intervals thereafter. Similar experiments were made on normal human eyes which were to be enucleated on account of orbital tumors. In one case the injection was made $2\frac{1}{2}$ hours before enucleation, in the others, 4 hours.

In the experiments on human eyes it was shown that the India ink was carried to the anterior portions of the ball and into the anterior chamber. Thence it passed almost exclusively into the iris, where one found a thick layer of pigment in the deep layers of the iris, separated by a thin layer of uninvaded tissue from the pigment epithelium. Only in two places, the periphery of the iris and the pupillary margin, did the coloring matter extend to the anterior surface of the iris. These two points form the entrance passages for the pigment, and correspond to the stomata described by Fuchs. The ink also collects about Schlemm's canal, without, however, entering it. Furthermore, the ink enters the ciliary body through the ciliary processes and collects in the walls of the vessels. It did not appear to enter the sclera.

In animals the iris seems to play a less important rôle in the absorption of the aqueous. A certain amount of ink enters at the root of the iris in the dog and a certain amount through the anterior surface of the iris at the pupillary margin, and from these points is diffused in a lessening stratum in the substance of the iris. In the cat the ink enters a number of stomata in the anterior surface of the iris at its periphery. In the rabbit, no ink had been found in the iris, which here seems to play no part in the absorption of the aqueous. In the chicken the ink appeared in numerous stripes throughout the entire extent of the anterior surface of the iris.

In all the eyes examined, both human and animal, the pigment followed the course of the blood-vessels and was deposited in their walls without entering the vessel lumen. This was also the case with Schlemm's canal. The walls of the vessels seem to form a fine filter which allows the passage of liquids but stops even the smallest particles of India ink. In man, therefore, the

iris forms almost exclusively the channel for the elimination of the aqueous, and if other authors performing the same experiments have come to different results it is because they have used rabbits for their experiments, and in this animal the iris plays almost no part in the absorption of the aqueous.

BENOIT : Channels of elimination at the posterior pole of the eye.

There are two channels of exit at the posterior pole of the eye, one from the vitreous through the optic nerve to the intervaginal space, the other consisting in a communication between the suprachoroidal space and the intervaginal space about the nerve head.

The first-named passage was demonstrated in the rabbit by Gifford, Ulrich, and Stilling. In the author's specimens India ink injected into the vitreous of the rabbit filled the circumvascular spaces of the central artery and finally collected in the sheath of the optic nerve. Experiments made on dogs and cats and on human eyes showed, however, that this channel of elimination existed here in but very slight degree, or not at all. The latter fact is of especial importance in the question of glaucoma, since the findings in rabbits had been taken to represent the conditions existing in man.

As to the second channel of elimination, the suprachoroidal space is embryologically a continuation of the subdural space, and in rabbits a direct free communication can be demonstrated. According to Michel and Schwalbe, this is also the case in man, but the communication is much less free.

SESSION OF SECTION B.

TSCHERNING : On the accommodative changes in the eye.

It has been known for years that in accommodation the reflex image from the anterior surface of the lens moves toward the median line of the eye. At the end of accommodation the image from the posterior surface of the lens moves downward independently of the position of the eye. It is not yet certain whether this indicates a displacement of the lens as one might readily suppose. Other circumstances make it appear probable that slight movements of the eye are accountable for it. The movement takes place in a curved line. It is better seen in the posterior

image than in the anterior, the excursion of the latter being about one quarter of the former.

PFALZ : On perverse astigmatism.

Astigmatism against the rule, which was formerly regarded merely as an unusual form of astigmatism, has through the labors of various writers come to have a greater biological importance. The author's conclusions are as follows : 1. Astigmatism against the rule is not a congenital defect but an anomaly of corneal curvature appearing with advancing age. 2. The change in corneal curvature begins in youth in the sense of a decrease in the astigmatism according to the rule. It would appear that a flattening of the vertical meridian plays an important rôle, as this was often found. 3. Besides the curvature of the cornea the lenticular astigmatism, which is always against the rule, plays a more important rôle with advancing age. Sulzer's view, that all differences between central corneal astigmatism and total astigmatism are due to an excentric corneal astigmatism, is held to be incorrect. A marked excentric astigmatism against the rule may in early life be of optical significance, yet the author believes that in such cases the excentric astigmatism against the rule of the cornea makes it probable that there is a marked curvature of the lens against the rule. The fact that in the young without a central corneal astigmatism there is so rarely a total astigmatism against the rule, while in older persons this is so frequent, the author ascribes to the tone of the ciliary muscle and the greater elasticity of the lens, whose astigmatic curvature against the rule may only become optically manifest in later life. 4. Astigmatic accommodation plays a rôle in early life, but only in the sense of a lenticular astigmatism against the rule acting to correct a corneal astigmatism with the rule. The author has never seen a corneal astigmatism against the rule corrected by a lenticular astigmatism of the opposite sort, and this he considers impossible, owing to the form and elasticity of the lens.

As the causes of the change in corneal curvature the author cites diminished resistance of the cornea from general disturbances of nutrition, decreased elasticity of the ocular capsule, and perhaps, also, according to Gould, a lessening of the fatty cushion of the orbit, and the diminished resistance of the cornea from senile degeneration. Corneal astigmatism against the rule in early life is pathological, as shown by the facts that if present it is

usually of high degree, and there is usually a marked diminution in acuteness of vision.

SESSION OF SECTION C.

SCHIRMER : On benign post-operative cyclitis due to infection.

In the course of a year Schirmer had sixteen cases of post-operative cyclitis which were midway between those severe infectious troubles that destroy the eye and the mild irritation of the iris which follows mechanical and chemical insults. The inflammation appeared as a serous cyclitis with numerous deposits on Descemet's membrane, beginning ten to twelve days after the operation, lasting two or three weeks, and being cured by atropine, hot fomentations, and salicylates without injury to the sight. It was finally attributed to the faulty preparation of a 3-per-cent. solution of boric acid in which the cotton used for sponging was dipped. Since this solution had been systematically boiled a hundred extractions had been done without any signs of infection. Therefore the author concludes that, in spite of its benign course and long stage of incubation, the inflammation was due to infection during the operation.

Discussion.—KNAPP, GUTMANN, and GOLDZIEHER called attention to the fact that with inflammations of this sort there is frequently increased tension, as Schirmer noted in several of his cases, which, however, yielded to the use of eserine.

UHTHOFF asked if the improperly prepared boric-acid solution had been examined bacteriologically, and was answered in the negative.

STRAUB : On hyalitis.

Straub called attention to the fact that at the Heidelberg meeting in 1896, he had expressed the opinion that from the present view-point of inflammation hyalitis should be sharply differentiated from cyclitis or general uveitis. Since then he had studied the matter from a clinical standpoint and had found that the symptoms of experimental hyalitis could be found in clinical cases also. Such symptoms were exudation into the vitreous, fibrin in the pupil, adherence of the margin of the iris to the capsule of the lens, filling of the posterior chamber with exudation, hypopyon, increased tension in the beginning, and later hypotony.

He analyzed twenty-seven carefully observed cases which formerly would have been called iritis, irido-choroiditis or cyclitis,

glaucoma, or panophthalmitis. A separation of the cases of hyalitis has the advantages that the prognosis can be made more accurately and that oculists would be forced to study true cyclitis and uveitis more carefully, whereby more information in regard to sympathetic ophthalmia might be gained.

Discussion.—SCHMIDT-RIMPLER confirmed the possibility of the existence of inflammation of the vitreous, but doubted whether it was possible to separate it clinically from iritis and cyclitis, since the clinical symptoms were so similar.

GREEFF also admitted the existence of hyalitis.

SCHIRMER stated that one could not speak of inflammation of a membrane when only leucocytes had wandered in from other parts. The cells of the membrane itself must show inflammatory changes, and such changes have not yet been found in the cells of the vitreous, wherefore Schirmer does not accept this diagnosis.

SCHOEN : **On scleritis and its relation to myopia.**

The changes which occur in the elongating of the eye are three. The first is the purely mechanical distortion due to convergence, the second the purely mechanical stretching of the choroid to cover the greater area. These were brought forward by Schoen in 1893, and he now adds a third after finding that scleritis is never an independent affection but one always complicated with adhesions to the sclera. An evident sign of previous scleritis is the adhesions always found between sclera and choroid in myopia of high degree.

Discussion.—UHTHOFF called attention to the late publication by Heine in which the doctrine of the displacement of the optic nerve sheath is refuted. He finds a progressive atrophy of the choroid at the position of the conus. Uhthoff asked what anatomical proof Schoen had of a true inflammation of the sclera, upon which Schoen again called attention to the adhesions between sclera and choroid.

E. TREACHER COLLINS : **Anatomy and congenital defects of the ligamentum pectinatum (with lantern slides).**

MULDER : **Pathologico-anatomical demonstrations.**

OLE BULL : **Drawings and chromatic tables.**

DIMMER : **The photography of the fundus.**

Dimmer has obtained photographs 36 mm in diameter and covering a field of 4 disc diameters, in which no corneal reflex is visible.

The illumination is obtained through reflection in a glass rod

which is held before one half of the dilated pupil and covers the corneal reflex. The inverted image is photographed with a Zeiss anastigmatic lens. The source of light is an arc lamp, and the exposure is 4-5 seconds. All lateral light is cut off and the head is fixed in a holder.

The present non-uniform illumination will be avoided in the perfected instrument on which the author is now at work and with which he expects to photograph pathological cases.

DOR : Projections of colored photographs from nature.

AXENFELD : Pathologico-anatomical demonstrations.

1.—*Miliary tubercle of the lachrymal gland in a case of general miliary tuberculosis.* This proves the existence of endogenous tuberculosis of the lachrymal gland. Since the author found the lachrymal gland free from tubercles when tuberculosis of the conjunctiva had existed for years, it is probable that most cases are not primary and ectogenous, but secondary and endogenous.

2.—*Glaucomatous excavation of the lamina cribrosa, without excavation of the disc.* The peculiar condition was found in an eye in which inflammatory glaucoma had existed for two weeks. It was probably to be explained as having been an optic neuritis with swelling of the disc, which had been pushed back by the increased tension, causing an excavation of the lamina cribrosa.

3.—*Preparations showing regeneration of the nerves after optico-ciliary neurectomy and of the anterior perforating ciliary nerves (cf. paper).*

Axenfeld demonstrated also a portable binocular Westien's loupe whose tubes can be moved to directions radiating from the point of fixation at 25 cm distance to fit any interpupillary distance. With this loupe one can work for hours without fatigue.

SECOND DAY'S SESSION, AUG. 16TH.

LEBER : On the nutritive relations of the eye.

The purpose of this paper was to discuss some of the questions of general interest in regard to the nutrition of the eye, supporting them on new experiments, which, however, were confined to the cornea, lens, and vitreous.

The author began with the exchange of liquids in the eye in general, and the purpose of this exchange to preserve the optic apparatus in an unchanged condition, assuring constancy of curvature and transparency of the refracting media. This is

subservd by the intraocular tension. The secretion of the liquid maintaining this tension is proportional to the difference in pressure between the contents and the surroundings of the vessels. A filter for the components of the blood which do not pass into the aqueous humor is the vessel wall. It is doubtful whether the epithelium of the ciliary processes takes any part in this.

The ciliary processes form the true secreting organ of the intraocular liquid.

It is not true, as supposed by Ehrlich and Hamburger, that the anterior surface of the iris takes part in the secretion of the aqueous. Leber has convinced himself of this by various experiments on animals, and the experiments of others have shown in fact that the anterior surface of the iris serves to absorb the aqueous humor.

That the ciliary processes form the secretory organ of the intraocular liquid is proven, finally, by the fact that in congenital irideremia, and after complete loss of the iris from trauma, the intraocular tension is normal, while secretion of intraocular liquid ceases entirely after the experimental removal of the iris and ciliary processes.

The preservation of tension at a constant height requires that the elimination of the aqueous should be retarded. Besides the well-known filtration into the circulus venosus, there is a slight outflow from the central canal of the vitreous in the circum-vascular sheaths of the central vessels of the optic nerve.

For the preservation of the intraocular tension the marked capacity of the cornea for swelling up is of importance. Both epithelium and endothelium serve to prevent an excessive absorption of liquid which would interfere with the transparency of the cornea.

The liquid contained in the cornea is not free but physically absorbed, and only traces of it can be squeezed out by ordinary pressure. If the cornea is swollen with liquid this may readily be expressed with slight pressure.

The author then passed to the subject of the nutrition of the tissues, and combated the view that every part of the body, even if it performs no work and needs no nutrition, must nevertheless be in a constant state of restoration and require a constant nutritive supply.

This idea can hold good only for the cells and other actively

functionating elementary organisms and not for the intercellular substances. The nutritive requirements of the cornea, lens, and vitreous are very slight and can be supplied wholly by means of diffusion. The fact that such parts are not vascular is rather an advantage, since an excess of nutritive material is prevented. The nutrition through diffusion is seen most clearly in the case of the lens, surrounded by its closed membrane.

Conduction takes place through the intercellular substances. In the epithelium this takes place through the intercellular spaces, which make up a communicating system which becomes dilated with the excessive conduction of nutritive material, as in inflammation of the cornea. There is no circulation in this system of cavities, since there is no free outlet.

In tissues with a fibrous intercellular substance the conduction of nutritive material generally takes place through the cavities in the tissues which are filled with liquid.

The process in the cornea, however, is peculiar in that conduction does not take place through such cavities or canals, but by diffusion through the entire intercellular substance. The absorption and spreading of soluble, diffusible substance in the living as well as the dead cornea may be followed by means of chemical reactions. Such substances spread first through the intercellular substance and enter the cells later if at all. In this way are produced the negative impregnation pictures of the cornea.

The nutritive substances follow the same course. The capsule of the lens and Descemet's membrane are pervious to albumen. In inflammatory processes the intercellular substance of the cornea is soaked with albuminous and fibrinous liquids. The nutrition of the cornea is for the most part provided for by the marginal vessels, yet the aqueous humor may take some part in the process.

The vitreous consists of a fibrillar framework filled with liquid which escapes on incision or after opening the anterior chamber, the liquid in the latter case filtering through the zonula. The source of the liquid is the same as that of the aqueous. The more albuminous nature of the vitreous can be referred to diffusion from the surrounding parts. This view is supported by the fact that after removal of the ciliary processes not only is the aqueous not restored, but the vitreous rapidly disappears entirely, without any signs of inflammation.

MICHEL : On free metastases from ocular tumors.

Michel described three cases of tumor of the eye : 1. An epibulbar large-celled alveolar sarcoma developed first on the temporal side, then on the nasal. At the same time there appeared in the cornea beneath its centre a minute gray nodule which microscopic examination proved to be sarcomatous, it having in some parts an alveolar structure like the epibulbar nodules. The corneal nodule lay beneath the superficial layer of epithelium in the otherwise normal cornea. It is probable that sarcoma cells were loosened from the primary nodules and lay in the conjunctival sac, or that the prominent epibulbar nodule was forced over the cornea by a movement of the lid which rubbed away the epithelium and at the same time inoculated the cornea. 2. A metastatic carcinoma of the choroid had spread along one of the vena vorticiosa into the sclera. A small carcinomatous tumor was found also in a niche between two ciliary processes which were otherwise normal, the tumor having probably arisen from carcinoma cells which had become detached from the main tumor and, floating free in the vitreous, finally lodged between two ciliary processes. 3. An epibulbar, small-celled sarcoma appeared first on the nasal side, then on the temporal. The enucleated ball showed that the entire uveal tract was pervaded with sarcoma cells, particularly the ciliary body, from which extension was taking place along the vessels and nerves. On the posterior surface of the cornea sarcoma cells were found, both in small nodules and in layers one or more cells deep. The endothelium and the cornea itself seemed normal. It is likely that cells from the iris and ciliary body became mingled with the aqueous and found on the posterior surface of the cornea favorable conditions for further growth.

From all this two conclusions may be drawn : (1) that in cases of ocular tumor a free development of metastatic tumor elements may take place, and (2) that the growth of the metastatic elements takes place in a form which corresponds to that of the original tumor.

SIEGRIST : A contribution to the knowledge of arterio-sclerosis of the ocular vessels.

The author observed, in a man of sixty-five and in a woman of fifty with general arterio-sclerosis of high degree, a peculiar ophthalmoscopic change : besides some completely sclerosed choroidal vessels, others were of normal red color. On some

branches of the latter vessels were deposited wreath-like patches of pigment of various sizes.

The male patient died some months later, and the cerebral arteries showed a high degree of endarteritis. Within the elastica were numbers of vesicular, and often multinuclear, cells of epithelioid appearance, which narrowed the vessel lumen. Within these accumulations of cells were two or three layers of spindle-shaped endothelial cells surrounding the lumen.

In the eyeball the cause of the wreath-like pigment patches was found to consist in a proliferation of enlarged pigment epithelial cells immediately above certain diseased choroidal vessels. These new-formed epithelial cells had not altered the overlying layers of the retina. The underlying vascular changes consisted in sclerosis of the vessel wall, or in an endarteritis obliterans from hyaline degeneration, or, finally, in a peculiar form of endarteritis with large epithelioid cells between the endothelium and the elastica, such as was found in the cerebral arteries.

GOLDZIEHER : On iritis glaucomatosa.

Goldzieher observed five cases of iritis which were characterized by the sudden development of increased tension. In each case there had been a previous attack, and the second attack came on suddenly without attributable cause, with ciliary injection, synechiæ, and exudation. Then after some weeks the clinical picture suddenly changed, the pain became more severe, the cornea cloudy, the conjunctiva chemotic, the pupillary exudation fibrinous, and vision sank to perception of light.

The course was in all cases favorable ; under the use of miotics and hot applications each case was cured without operation. With the action of the miotics the fibrinous deposits in the anterior chamber became more numerous. Goldzieher believes that the increase in tension may have been due to a coagulation of the fibrinous exudation in the lymph channels of exit, rendering them impervious. [Spongy iritis, H.K.]

SCHOEN : The three essential anatomical changes in glaucoma.

Besides the two changes previously described in glaucoma, viz., the production of an excavation with an angular bending of the optic-nerve fibres, and the displacement of the ora serrata from muscular traction exercised through years, Schoen now describes as a third change the atrophy of the ciliary muscle. Instead of

the tense muscle bundles one finds relaxed, tortuous, empty tubules, whose transition to tendon fibres cannot everywhere be followed. The interstices between the muscle bundles are occupied by a hyaline material. The process is one of simple muscular atrophy, in conjunction with myositis interstitialis fibrosa. This atrophy is brought about by repeated over-fatigue.

Discussion.—HESS opposed the view that the angular bending of the optic-nerve fibres was due to muscular traction, since he had found this condition in the new-born when otherwise the eyes were normal. Furthermore, Hess and Heine, repeating the Hensen-Völkers needle experiment in the eyes of monkeys, found that the accommodative displacement of the ciliary muscle under electric excitation ceased shortly behind the equator of the eye, and, therefore, the assumption of muscular action in the region of the disc was entirely unjustified.

HESS: On the relation between accommodation and convergence.

Hess, in his investigations, proceeds from a fact which he has discovered, that it is easily possible to contract the ciliary muscle sufficiently to allow the lens to assume its maximum curvature, the zonula being entirely relaxed. By new methods of investigation he has been able to demonstrate that the customary distinction between a binocular and a uniocular near point does not agree with the facts. In fact both lie practically at an equal distance from the eye. The difference is only an apparent one, due to the fact that in the usual methods of measurement the uniocular near point is determined with a much smaller pupil than the binocular. Hess was able to show, further, that Donders's well-known curves of the relative range of accommodation furnish an incorrect picture of the connection between convergence and contraction of the ciliary muscle and that the different segments of the curve correspond to entirely different relations. This connection follows, according to Hess, the following law: "With every convergence is associated a medium accommodation of particular degree. This may increase or diminish within certain limits while convergence remains fixed. The amount of this variation is approximately the same for all degrees of convergence, *i. e.*, the play of accommodation with a given convergence is independent of the absolute degree of convergence."

In conclusion, Hess states that eserine does not increase the actual range of accommodation, as has been generally supposed, the apparent increase depending upon the narrower pupil.

G. J. BULL : Fatigue from the effort to maintain binocular vision.

One of the principal causes in bringing about a disturbance of binocular single vision is a difference in the refraction of the two eyes. On account of the difference in the images the accommodative effort is increased, and this leads to an unequal distribution of the motor impulse to the intrinsic muscles of the two eyes. The author referred to a stereoscopic apparatus for determining the amplitude of fusion, and the ability, with or without difficulty, to fix.

The subjective symptoms of which the patient may complain in such cases are not to be neglected. The author described the symptoms that are of diagnostic value, and called attention to the efforts which such a patient must systematically make in order to maintain binocular vision. The chief result of such efforts is a spasm of the ocular muscles ; this local condition of spasm may give rise to a general tendency to spasm which may cause spasm to appear in any portion of the body.

To illustrate his statements, the author described a case in which the local strain existing for years had brought about marked signs of neurasthenia, and proper treatment with the purpose of relieving the effort involved in binocular vision led to the patient's recovery from the general symptoms.

SATTTLER : On cataract from iron.

Sattler spoke of that form of traumatic cataract which is found six months or more after the entry of a splinter of iron into the lens, to which the iron gives a characteristic brownish color. In other forms of traumatic cataract, when the absorption of lens masses has not progressed far, the simple linear extraction which is employed in myopia of high degree is the best procedure, but in iron cataracts, even when in young persons, the curved section, as in senile cataract, is indicated.

Such lenses become, through the chemical action of the iron, denser and more coherent, so that they are usually readily delivered like a senile cataract.

The characteristic symptom of an iron cataract is a pronounced brownish discoloration in the neighborhood of the splinter. There is no great swelling of the lens, and a lustrous surface and indications of a radial figure are usually to be seen. Reddish-brown spots on the anterior capsule are not pathognomonic of iron cataract, since these may be present in cases in which the

iron lies in the deeper portions of the eye. Microscopically the lens fibres near the foreign body are found to be well preserved, as is often the entire lens, and vacuoles among the fibres are few or altogether wanting. Ferrocyanide of potassium and hydrochloric acid give the Prussian-blue reaction near the foreign body.

A. V. HIPPEL : The permanent results of myopia operations.

Hippel reports his experiences in the last six years. Within this period he has operated on 188 eyes, all but 4 of which have remained under observation for a considerable time.

He has had detachment of the retina in 10 cases (5.4%), this occurring in 3 cases after three or four years, in 6 cases after one year, and in 1 case after eight months. Among 1747 highly myopic eyes, 117, or 6.7%, had spontaneous detachment without operation. This favorable relation changes when one divides the patients according to their ages, since for those under thirty the percentage of losses is less favorable to the operation, while for those over thirty it is more favorable. In some cases opacities appeared in the anterior segment of the vitreous after operation, dependent upon chronic uveal inflammation. The operation does not offer a safeguard against detachment or central choroiditis. In none of Sattler's cases had the refraction found after the operation increased. The permanent acuteness of vision was reached about a year after the operation; this varies greatly, however, with the illumination.

In the *discussion* SATTLER and PFLÜGER agreed with Hippel's views. Pflüger believed that the opacities in the anterior portion of the vitreous were due to a too early discission.

OBARRIO : On the maximum of acuteness of vision.

The author's method of determining the acuteness of vision depends upon the observation of the minimum of deviation obtained when a ray of light is divided into two parts. The two parts remain exactly parallel. Under these conditions the author found that the minimum deviation for white light corresponded to an angle of 12 seconds.

COPPEZ (Brussels): On the effect of toxins upon the cornea.

One should first seek to find out in what way toxins produced in the conjunctival sac may affect the cornea. Diphtheria of the conjunctiva may be selected as a typical disease. A. por-

tion of the toxin passes into the general circulation ; another portion mixes with the tears and is carried over the bulbar conjunctiva and cornea. There is but little absorption through the bulbar conjunctiva, the toxin acting chiefly upon the anterior surface of the cornea. The epithelium offers an obstacle, but as soon as it is altered absorption takes place freely. The change in the corneal epithelium may be caused by treatment or by the action of the toxin itself, which loosens the epithelium in forty-eight hours.

Coppez's experiments taught him that the tears do not have an antitoxic effect on the diphtheria toxin, as Gosetti believed. The toxins do not contract the circumcorneal vessels, but rather dilate them.

DARIER : Massage in ocular therapy.

Darier spoke of the various sorts of ocular massage used by the ancients, and then took up the vibration massage of Makle-koff and the pressure massage of Domec. The latter acts well in accommodative asthenopia, in hyperopia in the young, and even in some cases of strabismus. In myopia, massage is supposed to have a stimulating effect upon the ciliary muscle.

Jocqs (Paris) : A method of rendering the lens quickly and completely opaque without rupturing the capsule.

Jocqs has tried the following experiment on dogs and rabbits : After anæsthetizing the cornea and dilating the pupil, he punctures the anterior chamber with a hypodermic syringe having a fine canula, and draws up some drops of aqueous humor which he then, without removing the syringe, injects deep into the lens. In from two to five days afterward the lens has become entirely opaque, and can be removed exactly like a soft cataract. The operation has not yet been done on man.

VALUDE (Paris) : The bactericidal action of the tears.

From a series of experiments Valude concludes that the tears form a very poor culture medium for micro-organisms, and that it is even possible in this way to neutralize the virulence of some varieties, such as the bacillus of splenic fever, the bacterium coli, and even, to some extent, the staphylococcus aureus. It is important to determine the alkalinity or acidity of the tears in their germicidal action, but this was not done in the author's experiments. Clinically, the author had given this subject some attention, always testing the reaction of the tears with litmus paper before his cataract operations. In three cases among

eighty, in which the tears had an acid reaction, the author had infection in spite of all attempts to prevent it, but the eyes were not lost.

DIANOUX (Nantes): On the treatment of corneal infiltrations with sea water.

After the author had tried all the usual subconjunctival injections in cases of infiltration of the cornea and had discarded them, he took up sea water on account of its chemical similarity to human serum. This was injected subconjunctivally and caused little pain or reaction. These injections may be repeated daily for one or two weeks.

GENERAL SESSION, AUGUST 17TH.

PANAS. On traumatic paralyses of the ocular muscles.

The tearing of the tendon loose from the sclerotic, which is frequently given as the cause of traumatic paralysis of the ocular muscles, must first be proven to take place; in general, at any rate, this explanation is wrong. Among the traumatic paralyses of nervous origin are those due to rupture of the nerve trunk at the base of the skull, which are much more frequent than nuclear paralyses. From the tenth year to old age traumatic paralysis of an ocular muscle is usually due to a fracture of the base, frequently through the petrous portion of the temporal bone, and more rarely to simple hemorrhage or meningitis. The contrary is the case in young children, in whom a lesion of one of the sinuses, particularly the inferior petrosal, is the chief cause. Congenital concomitant strabismus occurs and may be caused by mechanical pressure on the nerves in their intracranial course from meningeal hemorrhage.

NEUSTAETTER (Munich): Injections into the lachrymal canaliculi without the use of a canula.

Neustaetter finds that if a syringe with a 1 mm canula is placed over one punctum while the lid is everted slightly the liquid can readily be forced into the canaliculus.

DRUAULT (Paris): On the colored rings which are seen about a flame in normal pathological conditions. The relation between the extent of the colored ring and the elements which produce it allow us in some cases to determine the place in which the ring arises. These physiological and pathological rings are very numerous and I will confine myself to those seen in glaucoma and to two physiological ones. One of the physiological

rings is due to the fibrillar structure of the lens. Some persons see this ring when their eyes are in normal condition and most persons see it when the pupil is dilated. The instillation of a drop of cocaine is usually sufficient to bring it to view. The diameter of this ring is about 6° ; it disappears on both sides at once when more than half of the pupil is covered with a screen. The second physiological ring is somewhat smaller, measuring only 4° in diameter. This arises from the posterior epithelium of the cornea. It is easily demonstrated on a cornea that has been removed from the eye. The glaucomatous ring is usually due to cloudiness of the deep layers of the cornea, but it has been attributed to the lens. It can readily be shown that it is entirely different from the lens ring. Its diameter is 8° . Computation shows that the elements which bring it about have approximately the size of the epithelial cells of the deep layers.

DOR (Lyon) : **On the nervi nervorum of the optic chiasm.** Besides two small bundles of nerves which arise from the carotid plexus and run to the lateral angles of the sheath of the chiasm, there is a considerable number of fibres which arise from the sub-optic gray layer and run to the pial sheath of the upper portion of the chiasm. Part of these fibres cover the chiasm in front, forming Hannover's commissure, but another part appear again in the sheaths of the optic nerves and mingle with their fibres after passing through the sheath. These are fibres of centrifugal conduction, since they do not atrophy after enucleation. They appear to be the chief nervi nervorum of the optic nerves, and we believe that the changes which these fibres must suffer where they pass over into the suboptic gray matter, since there is an increase in the cerebro-spinal fluid, must be the cause of the œdema and swelling of the optic disc observed in cases of brain tumor.

KEMPNER : **A new instrument for detecting hemianopic pupillary reaction.**

Wernicke found that in hemianopsia due to lesion of the tract the pupils did not react when light was thrown upon the blind halves of the retinas. It is very difficult, however, to illuminate the blind half without letting some light fall upon the seeing half and bringing about contraction of the pupil. Fragstein and Kempner, therefore, constructed an instrument for this purpose as follows¹: A hollow cylinder was provided with a conical process with its apex anterior, having a 1 mm opening. In the cylinder is

¹ *Zehender's klin. Monatsbl.*, July, 1899.

an electric light before which are two plano-convex lenses of 50 mm focus. When the light is turned on, a strip of light 4-5 mm long and 3-4 mm broad appears at a distance of 5 cm from the small cylinder. With this it is very easy to determine whether or not there is hemianopic pupillary reaction.¹

LANS. On the width of the pupil.

In connection with the experiments of Schirmer and Silberkuhl Lans proposed the question, "What is the width of the pupil between 0-1000 meter candles, leaving out of consideration convergence, accommodation, psychic and sensory excitations, and maintaining full adaptation?"

His experiments were divided into three categories :

1. Determination of the width of the pupil after adaptation for 0 M. C.
2. Determination of the width of the pupil after adaptation for 0-25 M. C.
3. Determination of the width of the pupil after adaptation for 0-1000 M. C.

The results were as follows : After fifteen minutes' adaptation for complete darkness Lans's pupil had a horizontal diameter of 7.8 mm.

In the second category it was found that the width of the pupil corresponded to the intensity of the light.

In the third category the diameter of the pupil after complete adaptation for 25-1000 M. C. became less, the reduction being greater in the beginning. The results were demonstrated graphically, and showed a remarkable correspondence between the course of the lines representing the acuteness of vision with increased illumination, and those that were found for the diameter of the pupil after adaptation for equally strong light intensities.

HAAB. On intraocular disinfection.

Haab stated that for several years, and for two years before Ostwalt recommended iodoform, he had used it in cases of tuberculosis and for preventing suppuration after operations, and for the past year for developed purulent inflammations after traumatic or operative wounds. Basing his views on the good results obtained in seventeen cases in which he had introduced iodoform in the form of small pills into the anterior chamber or into perforating wounds, he concludes that iodoform has unjustly been dis-

¹ A similar but simpler instrument was devised for the same purpose several years ago by Henschen.—*Trans.*

credited and that it is of great service in purulent inflammations. It is well borne in the anterior chamber, and may remain for a long time without causing much irritation. It may perhaps serve as a preventive of sympathetic ophthalmia.

Discussion.—Several persons doubted the specific bacterial action of iodoform. Wicherkiewicz spoke of the good effects obtained by injecting protargol.

(*To be continued.*)

SYSTEMATIC REPORT ON THE PROGRESS OF
OPHTHALMOLOGY IN THE SECOND
QUARTER OF THE YEAR 1899.

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Metz ; Prof. DA GAMA PINTO, Lisbon ; DR. SULZER,
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DR. C. H. A. WESTHOFF,
Amsterdam ; and others.

Translated by Dr. WARD A. HOLDEN.

Sections I.-III. Reviewed by PROF. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

186.¹ KRAMER. The animal parasites of the eye. *Graefes-Saemisch Handbuch*. 2d edition, 9th, 10th, and 11th parts. Leipzig, 1899. W. Engelmann.

187. FICK. Hygiene of the eye. *Ibid.* 12th and 13th parts.

188. ELSCHNIG. Normal anatomy of the optic-nerve head. Comparison of ophthalmoscopic and anatomical findings. *Charts for Ophthalmological Instruction*. Edited by Magnus. Part xvi., Breslau, 1899. Kern.

¹ The titles of the report for the first quarter of 1899 were numbered 631-816 instead of 1-185.

189. SCHANZ. The bacteria of the eye. *Ibid.* Part xvii.
190. TERSON. Notes on ancient ophthalmology. *Arch. d'opht.*, xix., 6, p. 337.
191. JENSEN. Some ocular examinations of the aged. *Hospitals-tidende*, June 28, 1899.
192. GUILLERY. Remarks on acuteness of vision and marksmanship. *Deutsche militärärztl. Zeitschr.*, 1899.
193. WESTHOFF. Charitable policlinic in Amsterdam. Report for 1898 (1539 patients, 18 cataract operations).
194. GOERTZ. 5th annual report of the ophthalmic institute at Landshut, 1898.

TERSON (190) in his paper writes of the scientific importance and activity of a number of oculists who lived in the period from the time of the Arabs to the 18th century—from the time of Mandeville and Guy de Chanliac to Daviel. Even Fracastor recognized the nature and proper treatment of the contagious eye diseases and strove to prevent them. He endeavored to obtain antisepsis before and after his operations. A special cleansing of instruments was certainly neglected, as Verduc states that operators were accustomed to polish their cataract needles on their sleeves before operation. Paré mentioned the connection between ozæna and affections of the lachrymal sac. Fabricius ab Aquapendente considered in detail wounds and foreign bodies of the orbit and mentioned their danger as regarded the brain. He was the first to write of sympathetic ophthalmia. In regard to cataract operations he was very anxious and appears to have had poor vision himself, since he states that the operator must fix the patient so accurately that his own eyes even might be injured. A clever surgeon and operator on the eye was Franco, who recommended doing operations on the eyes of animals for practice.

The older eye specialists (often polyspecialists, such as cutters for stone, obstetricians, and dentists) were held in much lower regard than the surgeons, although persons of high station had a fancy for treating eye patients. Later, according to a decree given in Paris in 1699, they were not permitted to form a corporation separate from that of the surgeons. Yet the School of Surgeons gave them after an examination the title *chirurgien oculiste de Saint Côme*; Saint Yves, among others, acquired this title, and these were called by the surgeon to do eye operations at the Hôtel Dieu. Later a place was made here for an "oculiste

en titre," which place existed until Dupuytren's time. Besides this, the oculist of that day had the title "expert oculiste," which disappeared at the time of the revolution.

V. MITTELSTÄDT.

JENSEN (191) had an opportunity of examining a great number of persons between 60 and 80 years of age. Of the 647 persons of either sex examined 81, or 12.5 %, were emmetropic, 492, or 76.3 %, were hyperopic (+ 1. D in 36. %, + 2. D in 22. %, + 3. D in 9. %, + 4. to + 6. D in 8. %), and 55, or 8.5 %, were myopic, 20 being highly myopic. Hyperopia is therefore the usual refractive condition in the aged, and as a rule it is acquired, although we do not know in how far there is a constant increase with age. The higher grades of hyperopia have probably existed since youth.

One hundred persons were examined to determine the astigmatism; 20 of these had astigmatism against the rule varying from 1.-3. D. The author believes that this astigmatism and the hyperopia are caused by an acquired change in the form of the cornea and sclera. With age the ball gradually alters its form either from shrinking and diminution of tension or from the action of the muscles. Thus the visual axis becomes shortened so that the greatest curvature is at the equator. This process is modified by the functional preponderance of the horizontal muscles so that there is less decrease in the horizontal meridian or an increase in refraction.

DALÉN.

GUILLERY (192) calls attention to the fact that good marksmanship is not unusual in persons with poor vision, and he gives the striking example of a sergeant who, with scarcely half the normal acuteness of vision, was the best shot in his troop.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

195. LEBER and ADDARIO. Congenital panophthalmitis due to bacilli in a goat, with remarks on foetal inflammations of the eye and ocular malformations of the eye in general. *Graefes Archiv*, xlix., 1, p. 362.

196. ADDARIO. On the detection of bichloride of mercury in the aqueous humor after subconjunctival injection. *Ibid.*, 2, p. 375.

197. ADDARIO. Experiments on the entrance of soluble substances into the anterior chamber after injection beneath the conjunctiva. *Ibid.*, 2, p. 362.

198. LOBANOFF. On the importance of non-pathogenic micro-organisms in injection of the eye. *Wjest. Ophth.*, 1899, No. 2-3.

199. FANEAU DE COURMELLES. The X-rays in optics and in ophthalmology. *Rec. d'opht.*, 1899, 1, p. 5.

200. HIRSCHBERG. The magnet operation in ophthalmology. Leipsic, 1899, Vest & Co.

201. SNEGIREFF. On vibration massage in ophthalmology. *Inaug. Dissert.*, Moscow, 1899.

202. PARISOTTI. Considerations on perimetry. A new registering perimeter. *Bull. della R. Accad. di Med. di Roma*, xxv., 1-2.

203. BURNETT. Gangrenous ulcerations, affecting the face, including the eyelids of both eyes and destroying both eyeballs—the results of the bite of a man. *Four. Amer. Med. Assoc.*, June 24, 1899.

204. JOHNSON. Intraocular hemorrhage subsequent to cataract extraction and iridectomy. *Amer. Four. of Ophth.*, April, '99.

LEBER and ADDARIO (195) found a bilateral panophthalmitis in a new-born goat. There were pronounced changes in the retina and uveal tract, and purulent infiltration with beginning shrinking of the vitreous. These facts indicated that the process had existed before birth. The mother animal was apparently normal, but as other of her young had been unhealthy, it was justifiable to suppose some uterine affection. The purulent infiltration was due to bacilli which were found in great numbers in the vitreous. They appeared to belong to the group of pseudo-diphtheria bacilli. In this case evidently a microbic infection had been communicated by the mother to the foetus.

ADDARIO (196) found that the percentage of bichloride of mercury in the aqueous humor after subconjunctival injection was very small indeed and the injections, therefore, are of no antiseptic value.

ADDARIO (197) found that solutions of ferrocyanide and iodide of potassium injected beneath the conjunctiva passed by diffusion into the anterior chamber in from five to ten minutes. The maximum percentage in the anterior chamber was reached about an hour after the injection, and the substance could still be detected two or three hours after the injection.

LOBANOFF (198) made a number of experiments on rabbits by injecting into the anterior chamber or vitreous cultures of bacillus candidans, violaceus, ruber, subtilis, proteus vulgaris, prodigiosus, fluorescens putridus and mesentericus ruber, micrococcus agilis

and roseus, and sarcina lutea. The three first were absolutely non-pathogenic. All the others caused inflammations of varying degree, usually a plastic iritis or iridocyclitis. HIRSCHMANN.

SNEGIREFF'S (201) article on vibrating massage, after an historical sketch and description of instruments and their uses, contains an account of many experiments on animals and clinical observations on the effect of massage on diseases of the anterior segment of the ball. Maklakoff's instrument was used to produce the vibrating massage and his tonometer for measuring tension.

The author's conclusions are as follows : Massage aids the diffusion of solutions from the conjunctival sac into the aqueous, proportionately to the time it is continued. Vibrating massage is more efficient than ordinary massage. Vibrating massage favors the clearing and vascularization of infected corneal wounds and the absorption of blood and pus from the anterior chamber. Intraocular tension is lowered, more materially in glaucomatous eyes than in normal, and repeated massage may keep the tension down for several days. Clinically, massage helps absorption in general, hastening the clearing up of infiltrations and exudations in the conjunctiva, cornea, uveal tract, and anterior chamber.

HIRSCHMANN.

PARISOTTI (202) has constructed a perimeter which in place of the quadrant arc has a straight rod inclined 25° , on which the test object moves. The perimeter is self-registering and the examiner is not in view to distract the patient's attention. The author believes that this instrument has advantages that make the results obtained with it more accurate than those obtained with the older instruments.

BURNETT'S (203) case was a woman of twenty-four years who was severely bitten about the face by her husband in a fit of madness. Extensive sloughing followed, involving the eyelids, the conjunctiva, and both eyeballs, resulting in total symblepharon and adherence of the lids to the orbital walls. No special microbe was found as a cause of the gangrene. BURNETT.

One of the cases reported by JOHNSON (204) was a cataract extraction in a man of seventy-one years, whose eye seemed in perfect condition. The operation was smooth with a small iridectomy, followed by no immediate hemorrhage. Six hours later, after severe pain the contents of the ball with much blood were found on the dressing. The other case was an iridectomy for glaucoma, with only slight bleeding from the iris, and a slight

tendency of the wound to gap. Four days afterwards there was much pain, and when the dressing was removed the contents of the globe were found on it. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

205. PRAUN. On the use of protargol in ophthalmology. *Centralbl. f. prakt. Augenheilk.*, xxiii., pp. 129 and 170.

206. GIDSCHEN. Protargol in eye diseases. *Wojenno med. Journ.*, 1899, No. 3.

207. SNEGIREFF. On the use of protargol in ophthalmology. *Med. Obosren.*, 1899, No 5.

208. HIRSCHBERG. On the question of holocaine. *Centralbl. f. prakt. Augenheilk.*, xxiii., p. 181.

209. WOLFFBERG. The formalin-bolus paste. *Wochenschr. f. Ther. u. Hyg. der Auges*, 1899, No. 33.

210. THORNER, WALTHER. A new stationary ophthalmoscope giving an image free from reflexes. *Zeitschr. f. Psych. u. Physiol. der Sinnesorgane*, xx., p. 294. (Preliminary communication. An excellent instrument, exhibited at the International Ophthalmological Congress at Utrecht.—H. K.)

211. CZAPSKI. A binocular corneal microscope. *Graefes Archiv*, xlix., 1, p. 229.

212. TRIEPEL. Further reports on the decentration of bispherical lenses. *Ibid.*, 2, p. 432.

213. HOWE. On a compound microscope for viewing the eye. *N. Y. Med. Journ.*, June 17, 1899.

214. GUTTMANN. Holocaine as a local anæsthetic. *Ibid.*, June 27, 1899.

215. TIFFANY. Electric dry heat in ulceration of the cornea. *West. Med. Journ.*, Apr., 1899.

216. COOVER. The use of egg membrane in ophthalmic surgery. *Ophth. Record*, May, 1899.

217. STILLSON. Some experiments with the great magnet. *Ibid.*, March, 1899.

PRAUN (205) uses protargol 1 : 10 for fomentations, instillations, salves, and for irrigating the lachrymal passages. He obtains good results in the various forms of conjunctivitis and keratitis.

GIDSCHEN (206) found protargol solutions less irritating and quicker in action than solutions of nitrate of silver. Even trachoma and pannus are cured by its use. HIRSCHMANN.

According to SNEGIREFF (207) protargol has no advantages over nitrate of silver. The signs of irritation are even more marked than after the use of silver. HIRSCHMANN.

According to HIRSCHBERG (208) holocaine is preferable to cocaine. Its action is more intense in iridectomy, strabismus operations, and cauterization of corneal ulcers.

HOWE (213) describes a compound microscope mounted so as to make an examination of the anterior parts of the eyeball—a kerato-iridoscope. The objective has two systems, separated from each other by 8 *cm.* The focus of the two systems is 12 *cm.* and has an angular aperture of 35°. Suitable eye-pieces are placed at the other end of the tube in which they are mounted. This tube, which is 28 centimetres long, is mounted on a suitable stand, with rack and pinion adjustment for focussing. The amplification is from 50 to 125 diameters. BURNETT.

As between cocaine and holocaine, GUTTMANN (214) finds the latter preferable in strabismus operations, removal of foreign bodies, and inflammatory states of the conjunctiva and cornea. Cocaine is preferable when an iridectomy is to be made. BURNETT.

TIFFANY (215) has devised a pad of felt, with a coil inside, through which an electric current can be run, giving any desired amount of constant and continuous heat. He has found this very useful in the various forms of corneal ulcerations. BURNETT.

COOVER (216) has used the inner membrane of the egg as a covering for denuded surfaces on the eyeball, ulceration of the cornea, and incised wounds, with much satisfaction. BURNETT.

As a result of some experimenting with the large magnet of Haab, STILLSON (217) has formulated a number of aphorisms, from which we extract the following as of most interest: Usually the best line of force to use is the line that radiates from the tip of the magnet. The management of the foreign body will depend more upon its shape than is generally believed. If the body is disc-like, it should be made to saw its way with the edge forward; if it be pyramidal, the point should be extracted first. It is a mistake to place the patient at a distance and cause him to

approach the magnet gradually. Small pieces that are behind the iris are difficult to remove by means of the large magnet. For these an iridectomy, with or without a Hirschberg magnet, is the best. Large pieces may be made to perforate the iris or conjunctiva if they have a suitable shape and are properly managed. Where large pieces have entered through the sclera without injury to the lens, it is best to make a hole nearest the point where they lie and extract through this. The large magnet should not be used for diagnostic purposes on account of the harm it may do to the tissues by laceration.

BURNETT.

Sections IV.-VII. Reviewed by DR. ST. BERNHEIMER,
Vienna.

IV.—ANATOMY.

218. TERRIEN. The mode of insertion of the zonula fibres on the lens and the relation of these fibres to one another. *Arch. d'ophth.*, xix., April, 1899.

219. ISCHREYT. Anatomical and physical investigations on the sclera of the ox. *Graefe's Archiv*, xlviii., 2, p. 384.

According to TERRIEN'S (218) investigations, the zonula fibres running to the lens form two groups. The first consists of fibres which run to the anterior and posterior capsule of the lens, and a short distance from it break up into fine elementary fibres, each of which passes to the capsule, rests upon it for a short distance, and then gradually becomes incorporated into it.

The fibres inserted into the anterior capsule lie in the capsule for a farther distance than those inserted into the posterior capsule. The second group consists of fibres running to the equator, which are more delicate, but at times spread out fan-shaped or in irregular shapes, and have transverse connecting fibres. Just before reaching the equator of the lens they break up into elementary fibres, each of which has a punctate insertion into the capsule. The terminations of the zonula fibres on the capsule of the lens are like their origins in the lamina vitrea of the choroid; at both places the fibres are very fine. The anterior and posterior fibres serve the purpose of accommodation, while the intermediary merely maintains the position of the lens.

V. MITTELSTÄDT.

ISCHREYT (219) characterizes the sclera as a complicated organ.

Microscopic examination reveals a systematic arrangement of fibre bundles. In the posterior segment the bundles run for the most part obliquely, crossing one another at right angles like the cords in the network of a balloon. In the region of the retractor muscle, superficial ring bundles are found, between which the prolongations of the tendons enter in a meridional direction. The same is the case where the recti muscles are inserted. The tendons branch and broaden out, and are inserted among the ring bundles. A ridge of firmer ring bundles lies external to this zone, and completes the anchoring of the muscle tendons. At the limbus the tissue, which is elsewhere fairly simple in structure, forms a confused network.

The physical studies are in reference to the extensibility and strength of different portions of the sclera, the relations differing greatly in different parts. If there is in the sclera an elastic compensating arrangement to suit different tensions, this exists only in its posterior portion.

V.—PHYSIOLOGY.

220. UTHOFF. A contribution to congenital total color-blindness. *Zeitsch. f. Psych. u. Phys. d. Sinnesorg.*, xx., 4-5, p. 326.

221. ZEHENDER. The form of the vault of the heavens and the apparently greater size of the stars near the horizon. *Ibid.*, p. 353.

222. ASHER. Monocular and binocular field of fixation of an emmetrope. *Graefe's Archiv*, xlviii., 2.

223. WELLS. Keratometry and astigmatism. *Homeopathic Eye, Ear, and Throat Journal*, April, 1899.

UTHOFF (220) presents an accurate and valuable study of a patient who was congenitally totally color-blind, in which the observations of earlier writers are confirmed and undecided questions are made clearer.

Uthoff found, as did Koenig in his case, that there was a central scotoma, 1.5° in diameter, which would indicate an absence or a functional disturbance of the cones in the macula. The peculiar nystagmus showed that there was not a circumscribed spot of distinct vision at the macula, and the patient in steady fixation used first one and then another portion of the equally functioning macula. In the spectrum the achromatic

patient found the red end markedly shortened, the violet end not. The brightest point in the spectrum lay in the green at about $530\ \mu$.

The results of comparative examinations of the achromatic and the normal eye agreed with Hering's ideas as to the white and color values of the colors.

In examining 837 eyes, by means of Javal's instrument, WELLS (223) finds that the findings of Javal and the findings with the test lenses agree in 31 %, varied 0.25 D in 35 %, varied .50 D in 19 %, and 0.75 D in 13 %. One hundred eyes, under a mydriatic, give a much closer approximation.

BURNETT.

VI.—REFRACTION AND ACCOMMODATION.

224. SZILI. On the question of the operation for myopia with demonstration of patients. *Ung. med. Presse*, 1899, No. 10.

225. MOHR. An operated case of myopia. Bericht. ü. d. Sitzung d. Budapester Aerztevereins. *Ung. med. Presse*, 1899, No. 10.

226. HERTEL. A contribution to the question of myopia operations. *Graefe's Archiv*, xlviii., 2.

227. SCHMIDT-RIMPLER. The operative treatment of myopia of high degree and its indications. *Therapie der Gegenwart*, i., 4.

228. WÜRDEMAN. The surgical treatment of high myopia. *Annals of Ophth.*, April, 1899.

SZILI (224) and MOHR (225) oppose the practice of operating on both eyes in myopia, since we have not yet sufficient experience as to the final outcome. It is to be remembered, further, that after the operation near vision with the correcting glass is never so good as the near vision was before the operation and thus the patient has the disadvantage of poorer near vision to overbalance the advantage of improved vision in the distance.

HERRNHEISER.

In 8 of the 24 patients operated on for myopia in the Jena clinic, HERTEL (226) saw opacities appear in the pupil at various intervals after the complete absorption of the lens.

In 6 cases there were tough secondary cataracts which must be taken into account in formulating the final prognosis, since in dividing these the vitreous must be incised, which is not an innocent matter in myopic eyes.

In 2 cases, however, the opacities were due to changes in the anterior portion of the vitreous.

No cause can be assigned for these changes in the vitreous, but they must not be disregarded. This is another reason for not operating on both eyes.

SCHMIDT-RIMPLER (227) discusses the advantages and disadvantages of the myopia operation. He considers the operation an important advance in the therapy of myopia, but it is to be employed only under restricted indications and with the necessary precautions. The operation does not check the pathological changes in the eye due to the myopia, it is not without danger, and its only purpose is to improve distant vision in selected cases.

In addition to a history of the surgical treatment of high myopia WURDEMAN (228) gives a case of his own in a woman of twenty whose refraction was $R - 17 \text{ } \bigcirc - 2.75 \text{ } 180^\circ$. $L - 16 \text{ } \bigcirc - 1.50 \text{ } 180^\circ$. $V = \frac{6}{38}$ — after absorption of the lenses. $R + 1 \text{ } \bigcirc + 2 \text{ } 115^\circ$. $V = \frac{6}{24}$. $L + 2 \text{ } \bigcirc + 3 \text{ } 75^\circ$. $V = \frac{6}{24}$. BURNETT.

VII.—MUSCLES AND NERVES.

229. AUERBACH. On the curvature of the anterior surface of the cornea. *Medic. Obosrenji.*, 1898, xii.

230. AUERBACH. Changes in corneal astigmatism due to operations on the recti muscles. *Ibid.*, v.

231. REDDINGIUS. On the nature of squint and the indications for operative interference. Gravenhagen, 1899.

232. DU BOIS-RÉYMOND and SILEX. On cortical excitation of the ocular muscles. *Arch. f. Anat. u. Phys., Phys. Abth.*, 1899, p. 174.

233. SACHS. On alternating squint. *Graefe's Archiv*, xlviii., 2.

234. BERNHEIMER. Remarks on Bach's paper "On paralysis of the ocular muscles" etc. *Ibid.*, 2 and 3.

235. SCHWEIGGER. On the technique of advancement for squint. *Arch. f. Augenheilk.*, xxxix., 2, translated in these ARCHIVES, 1899, No 4.

236. DUANE. Divergent strabismus cured by correction of myopia. *Ophth. Record*, April, 1899.

237. STEVENS. Historical notes on strabismus and other anomalies of the eye muscles. *Annals of Ophth.*, April, 1899.

238. POSEY. A clinical study of 287 cases of hyperphoria. *Philada. Med. Fourn.*, April 8, 1899.

239. ROOSA. The Panas operation for strabismus. *The Post-Graduate*, March, 1899.

AUERBACH'S (230) examinations with the Javal-Schiötz ophthalmometer showed that there is a gradual increase in radius of curvature from the centre of the cornea toward the periphery. This increase is not uniform, but becomes greater toward the periphery. The flattening of the cornea is more pronounced in the medial half than in the lateral. In order to determine whether this peculiarity is not due to the traction of the ocular muscles, Auerbach examined seventeen eyes, both before and after squint operations. After tenotomy of the internal rectus, the corneal astigmatism increased from 1. to 1.2 D. The increase in curvature was constantly in the vertical meridian. Tenotomy of the external rectus gave the same result, but less constantly. Tenotomy with advancement of the antagonist caused a decrease in refraction in both meridians.

HIRSCHMANN.

SACHS (233) reports on a number of experiments made with the purpose of learning the conditions under which alternation of squint takes place, dividing all cases into four categories.

BERNHEIMER (234) refutes Bach's objections to his ideas as to the localization of the nuclei for the intrinsic muscles of the eye, and offers a new experimental proof of the correctness of his views. If the upper portions of the corpora quadrigemina are removed from a narcotized monkey, and the region of the oculomotor nucleus divided by a smooth section through the middle, excitation of the nuclear region will cause isolated movements of the eye of the same side and contraction of its pupil. This pupillary contraction only occurs when the electrode is passed beneath the aquæduct in the anterior third of the anterior corpus quadrigeminum. This is exactly the location of the small-celled medial nucleus in the monkey and in man. From no other spot can pupillary contraction be obtained with a current of the same strength.

In the case reported by DUANE (236) there was M of 6 D in R, 11 D in L, with a strab. divergens of two or three lines. A constant nearing of correcting glasses, and an exercise of the left eye, caused a disappearance of the strabismus during their use. It reappeared if the glasses were left off.

BURNETT.

STEVENS (237) in this interesting paper describes the progress

made in the methods of investigating deviation of the eyes and anomalies of ocular muscles and their treatment, from the time of Ambroise Paré to our own period, in which he himself has played such an important part in the development of the subject in all its relations.

BURNETT.

According to the statistics of POSEY (238) hyperphoria of 1° or more exists in about 13% of all cases of refraction. It may or may not exist with lateral heterophoria. It may or may not be associated with ametropia. It is present in all cases of anisometropia when the difference between the two eyes is at all marked. It is always present in both convergent and divergent strabismus. It is frequently latent—correction of the associated ametropia is not sufficient in the majority of cases to subdue the hyperphoria. As to treatment he tenotomizes only after prisms have failed to give relief.

BURNETT.

ROOSA (239) reports four cases of strabismus, three internal, one external—treated by Panas's method of stretching the muscle before the tendon is divided. The results in all cases but one, were satisfactory.

BURNETT.

Sections VIII.—XII. Reviewed by DR. R. SCHWEIGGER.

VIII.—LIDS.

240. KUGEL. On an operative procedure for the relief of thickening of the lids after ulcerous blepharitis. *Graefe's Archiv*, xlviii., 2, p. 459.

241. WESTHOFF. Distichiasis congenita hereditaria. *Med. Weekblad*, May 13, 1899.

242. HIRSCHBERG. "Penelope," an unusual lid operation. *Deutsche med. Wochenschr.*, 1899, No. 26, p. 418.

243. ABADIE. The nature and treatment of zona. *Arch. d'opht.*, xix., No. 5, p. 306.

244. VAN DUYSE. Elephantiasic cavernous lymphangioma of the lid in a new-born infant. *Arch. d'opht.*, xix., 5, p. 273 (with illustrations).

245. GOTTI. On the treatment of ectropium by cauterizing the conjunctiva. *Bull. delle Scienze Med. di Bologna*, March, 1899.

246. JÆSCHE. Remarks on lid operations. *St. Petersburg med. Wochenschr.*, 1899, No. 14.

247. KOSTER. A new ptosis operation. *Zeitschr. f. Augenheilk.*, 1899, i., 6, p. 543.

248. OLIVER. Brief report of a case of fibroma of the eyelid (painful subcutaneous tubercle of Wood). *Ophth. Record*, June, 1899.

KUGEL (240), in a patient aged eight, with thickening of the lid and recurrent ulceration, relieved the thickening and the tendency to ulceration by removing several lamellæ from the tarsus by splitting the lid.

WESTHOFF'S (241) patient, a girl of eight, had photophobia. The cilia were normal on each side, the lid margins were normal, and there was no trace of blepharitis. On the sharp inner margins of both the upper and lower lids could be seen a great number of fairly long normal hairs. On the upper lids these were at least fifteen in number. The conjunctiva was red from the irritation, but there was no sign of trachoma. After epilation the photophobia passed off and the eye was no longer red. Electrolytic epilation was then employed.

The mother of the child had had from birth lashes that turned in, as had also a brother of the patient and several other relatives. True distichiasis (a double row of cilia) is rare, and hereditary cases have not been described.

In a patient operated on for entropium according to the Spencer-Watson method, a strip of skin being implanted between the lashes and the free margin of the lid, HIRSCHBERG (242), on account of the disfigurement and the presence of irritating fine hairs, returned the cilia to their old location and covered the intermarginal space with mucosa from the lip.

According to ABADIE (243) herpes zoster ophthalmicus is in no sense an affection of the first branch of the fifth nerve, but an affection of the vasomotor nerves. This is indicated by the fact that the skin eruption does not correspond to the course of the nerves, but to that of the vessels which follow the nerves for a short distance and then leave them. If an intracranial inflammation affects the trigeminus or the Gasserian ganglion, the sympathetic fibres of the carotid plexus arising from the superior cervical ganglion would also be involved. The sensory disturbances are thus brought about by the trigeminus, while the vasomotors cause a dilatation of the vessels and the inflammatory changes in the skin which in their distribution follow exactly the branches of the ophthalmic artery. The lack of cutaneous

disturbance on the upper and lower jaws is explained by the fact that the vasomotors of this region do not run in the carotid plexus. A further proof of his views is found by the author in the fact that in herpes zoster of the thorax the upper three intercostal spaces remain unaffected because their arteries (arising from the subclavian) and vasomotor nerves have a different origin from the other intercostal arteries, which arise from the aorta. Abadie's explanation makes comprehensible the severe brain symptoms which sometimes occur with zona (hemiplegia from rupture of dilated vessels). In the way of treatment Abadie recommends quinine, which contracts vessels.

V. MITTELSTÄDT.

After a short résumé of the new observations in the literature, VAN DUYSE (244) describes a congenital lymphangioma in an infant three weeks old. The hemispherical elastic tumor which was situated in the left upper lid was one of the largest that has been seen. It occupied the greater portion of the left frontal region, covered a portion of the cheek, extended inwardly beyond the middle line of the nose and outwardly to the external margin of the orbit. The skin, which was not movable above it, was smooth and unchanged, as was also the conjunctiva both palpebral and bulbar. After the death of the infant from gastro-enteritis the tumor was about one third smaller than before. When incised a clear yellow serum escaped from the spongy tissue making up the bulk of the tumor, in which were many cysts as large as a cherry. The supporting tissue of the tumor, which was in intimate connection with the skin of the lid, the tarso-orbital fascia, and the periosteum of the frontal bone, consisted of fibrillæ and elastic fibres. The lymph spaces were lined with a single layer of endothelium and were partly filled with red blood corpuscles. One cyst was filled with blood, indicating a communication between lymph- and blood-vessels.

V. MITTELSTÄDT.

GOTTI (245) reports a case of extensive ectropium with great thickening and swelling of the conjunctiva which was cured by cauterization with the thermo-cautery.

KRAHNSTÖVER.

KOSTER (247) improved the old Pagenstecher method, which did very well before asepsis was introduced, by passing the sutures from the lid margin to the forehead entirely beneath the skin and allowing them to remain. They were passed out divergent above and tied so tightly that at the time of operation the patient could barely close the lids.

OLIVER (248) describes and figures a case of small fibroma of the eyelid accompanying the appearance of these painful subcutaneous tubercles (Wood) on other parts of the body. On section these nodules show curvilinear circumscribed bundles of densely packed fibrous tissue containing many blood-vessels.

BURNETT.

IX.—LACHRYMAL APPARATUS.

249. HERTEL. A contribution to the pathological anatomy of disease of the lachrymal sac. *Arch. f. Ophth.*, xlix., p. 21.

250. RICCHI. Bacteriological researches and brief clinical considerations on some cases of lachrymal tumor. *Ann. di Ottalm.*, xxviii., p. 17.

251. BETTREMIEUX. A second contribution to the study of neuralgias and tics of the face considered in their relation to a pathological state of the lachrymal passages. *Arch. d'ophth.*, xix., 4, p. 246.

According to HERTEL (249) the diseases of the tear sac appear under the same pathological pictures as the diseases of other tubes of mucous membrane, for example, the chronic suppuration with degeneration of the epithelium, accumulation of goblet and lymph cells, infiltration with round cells, loss of epithelium and basal membrane, and stricture. In the normal mucous membrane of the tear sac and in the neighboring nasal portion Hertel found lymph cells in a particular arrangement, but glands were wanting. In tear sacs that had been vigorously treated the degeneration was clearly to be seen.

BETTREMIEUX (251) is convinced that neuralgias and spasms of the face may arise from an irritation of the trigeminus fibres running in the mucosa of the nasal duct. These affections may be brought about by even very slight changes in the mucosa, such as might be caused by a small bony projection which was not large enough to block the canal which is always found to be patulous. Nevertheless probing had an excellent result in a previous case and in two later cases, in one a neuralgia of the trigeminus being entirely cured and in the other a facial spasm being very much improved. The author adds an old observation by Philippart, who found that after the introduction of Dupuytren's permanent sounds into the nasal duct the epiphora ceased, but a tic douloureux was induced which passed off only when the sound was removed.

V. MITTELSTÄDT.

X.—ORBIT.

252. GROENOUW. Shot wound of the orbit with determination of the presence of the bullet by means of the Roentgen rays. *Klin. Monatsbl. f. Augenheilk.*, xxxvii., May, 1899.

253. AHLSTRÖM. Extirpation of a retrobulbar tumor with preservation of the eyeball. Osteoplastic resection of the temporal margin of the orbit. *Hygieia*, May, 1899.

254. SCHMEICHLER. On protrusion of the ball. *Wiener med. Wochenschr.*, 1899, No. 8 *et seq.*

255. DE SCHWEINITZ. Fistula of the orbit due to disease of the lachrymal division of the ethmoidal cells. Operation and cure. *Ophth. Record*, June, 1899.

256. GIFFORD. Pulsating exophthalmus from aneurismal varix in the neck. *Ibid.*, April, 1899.

257. DENIG. Varicose veins in the orbit. *Ibid.*, May, 1899.

258. HOTZ. Mucocoele of the ethmoidal cells simulating an orbital tumor. *Four. Amer. Med. Assoc.*, April 1, 1899.

GROENOUW (252) discovered by means of the Roentgen rays the seat of a 6 mm bullet in the orbit. For orientation in the skiagraphs he passed one wire about the head horizontally and another vertically, and indicated the bridge of the nose by a shot fastened to the skin with plaster. In one of his patients the eyeball had been grazed, causing some diminution of vision; in the other one eye was blind from a rupture of the choroid, and the second from injury of the nerve.

AHLSTRÖM (253) in one case employed the Krönlein method with good results.

In SCHMEICHLER'S (254) five cases of exophthalmus a syphilitic neoplasm was the probable cause of one, an angioma in another, while in three cases there was probably merely an innocent abnormality in the structure and contents of the orbit.

The case reported by DE SCHWEINITZ (255) was that of a young woman of nineteen, who had suffered from a discharge from the inner angle of the orbit for five years and had been treated for lachrymal trouble without cure. De Schweinitz found a fistula running back into the ethmoid which he opened up, curetted, and drained through the nose by means of a fenestrated tube in the manner suggested by Gruening. There was also some caries of the nasal bones which was treated by Dr. Freeman. The case healed without any deformity. BURNETT.

GIFFORD'S (256) case is a man who after a severe blow on the neck, which was followed by an immediate large swelling, experienced an exophthalmus of the left eye and a paralysis of the left externus. There is no evidence that the aneurism has invaded the orbit. Gifford thinks the exophthalmus and the paralysis of the external rectus due to increased pressure on the cranial sinuses caused by the aneurism of the neck, the pressure being transmitted through the petrosal sinuses to the cavernous sinus. The trouble has existed four years. BURNETT.

In the case recorded by DENIG (257) the tumor of varicose veins was situated near the top of the ball and could be easily palpated. There was a slight enophthalmus when the patient was in the erect posture, also some ptosis, but no paralysis of any muscle. Fundus normal. There were also some small varices of the under lip, and the patient suffered from hemorrhoids, and had varix of the leg. No treatment is given. BURNETT.

The case described in HOTZ'S (258) paper was a girl of thirteen who had had a fracture of the root of the nose and afterwards suffered with nasal catarrh. For a year past the left eye was noticed to bulge and the skin of the upper lid was at times red and painful. The movements of the ball were good and there was no diplopia. The fundus was normal. The tumor was situated on the inner wall of the orbit and felt smooth until it reached a little below the palpebral ligament, where a ragged edge of bone was felt. An incision let out about four ounces of creamy emulsion. The ethmoid was scraped out, and drainage was made through the nose by breaking down the lower wall of the ethmoid. In four weeks there was complete healing. BURNETT.

XI.—CONJUNCTIVA.

259. SCHMIDT-RIMPLER. Pseudo-trachoma caused by the hairs of plants. *Deutsche med. Wochenschr.*, 1899, Nos. 25, 26.

260. FEUER. My present method of treating trachoma. *Centralbl. f. prakt. Augenheilk.*, xxiii., April-May.

261. EWETZKI. Crescentic lipodermoid tumors of the bulbar conjunctiva. *Med. Obosrenie*, 1899, Jan.

262. KUHN. A modification of the method of using the expressor in trachoma. *Zeitschr. f. Augenheilk.*, i., 4, p. 259.

263. DUANE. Angio-neurotic œdema of the conjunctiva. *Ophth. Record*, viii., 4, p. 178.

264. SNYDACKER. Trachoma toxins and antitoxins. *Fourn. Amer. Med. Assoc.*, May 6, 1899.

265. ELLETT. A case of chancre of the conjunctiva. *Ophth. Record*, June, 1899.

266. WOODS. A case of intra-uterine gonorrhœal ophthalmia with loss of both eyes. *Fourn. of Eye, Ear, and Throat Diseases*, 1899, Jan.

267. BELL. Diphtheritic conjunctivitis cured with antitoxin. *Med. Record*, June 10, 1899.

268. PINCKARD. Diphtheritic conjunctivitis. A case treated with injections of antitoxin; recovery without danger to the eye. *Fourn. Amer. Med. Assoc.*, May 27, 1899.

SCHMIDT-RIMPLER (259) describes a case of nodule formation in the conjunctiva, similar to trachoma, caused by little light-colored hairs of plants which projected from the follicles and papillæ and in part could be removed with forceps.

FEUER (260) describes the treatment of trachoma that is quasi-official in Hungary. The remedies with which he cures his patient in from three to six months are nitrate of silver 2 %, which is employed against the inflammatory symptoms, and bichloride solution 1 %, which is rubbed into the conjunctiva with a hard pledget of cotton, each being used on alternate days. Soft nodules are expressed between the finger nails or rarely with an epilator. Cocaine anæsthesia is not sufficient. The mitigated silver stick is used when there is progressive pannus, and boric acid powder is used to clear up pannus. The excision of the retrotarsal folds and tarsus which he has seen practised in Eastern Prussia he finds seldom necessary. However, he does partial excision of the tarsus when its enlargement has caused ptosis, and when its curvature has produced entropium.

EWETZKY (261) describes five cases in which a crescentic tumor lay to the outer side of the cornea extending above and below into the fornices and laterally back into the orbit. In some cases hairs grew from the surface. Examination revealed an epithelial structure superficially, a dermal layer deeper, and finally fatty tissue which seemed to be continuous with the orbital fat. Ewetzky considers these tumors sufficiently typical to be classed as a special group under the name "crescentic lipodermoid of the conjunctiva." Their development probably begins in fœtal life.

HIRSCHMANN.

KUHNT (262) in trachoma uses an expressor with curved branches, without ectropionizing the lid, taking the entire lid between the branches under cocaine anæsthesia. He avoids evert-ing the lid because if the mucosa is densely infiltrated it will be ruptured, and if the retrotarsal fold has been excised, eversion is impossible.

264. Some time ago (February, 1899) SNYDACKER described a diplococcus which he deemed specific to trachoma. He has now made cultures and obtained a toxin with which he has been experimenting. He claims to have demonstrated the effects of these toxins on animals "to whose action doubtless are due those disastrous local effects with which oculists are so familiar." The antitoxin he has made he thinks will be beneficial in the early stages of the disease.

BURNETT.

ELLETT'S (265) case was a young man of twenty-four. There was an ulcer with elevated edges and a firm unyielding base on the conjunctiva of the right upper lid at the outer part. The pre-auricular gland on that side was swollen. The case was watched, without any treatment but cleanliness, and at the end of four weeks a typical roseola appeared on the body. Patient claims there was no other chance of infection aside from washing in the lavatories of hotels.

BURNETT.

In the case recorded by WOODS (266) a child at the time of delivery had redness and swelling of the lids, and there were already opacities of the corneas of both eyes. On the day of birth both eyes began to matter freely with the typical appearance of oph. neonatorum. The vaginal discharge of the mother showed large numbers of gonococci. Both eyes were lost.

BURNETT.

BELL'S (267) patient was a child of two years who had a membranous conjunctivitis which showed the presence of the Klebs-Loeffler bacillus. There was a temperature of 101.8°. After two injections of serum two days apart, and irrigation with 1 to 5000 bichloride solution, the disease practically subsided.

BURNETT.

The case treated by PINCKARD (268) was a man of twenty-three, who had a membranous conjunctivitis with the typical clinical and bacteriological pictures of the diphtheritic form. He had no other treatment than injections of antitoxin and cleanliness of the eye. The membrane did not begin to slough until about the

fourth day of the disease and after three injections of antitoxin had been administered of from 2000 to 4000 units.

BURNETT.

XII.—CORNEA, SCLERA, AND ANTERIOR CHAMBER.

269. LANGIE. A contribution to the etiology of parenchymatous keratitis. *Przegląd lekarski*, 1898, 22.

270. DIEZ. Contributions to the etiology of parenchymatous keratitis. *Zeitschr. f. Augenheilk.*, 1899, i., 5, p. 435.

271. GRÓSZ. Neuroparalytic keratitis. *Ungarische Beiträge z. Augenheilk.*, ii.

272. LAGRANGE. Primary tumors of the cornea. *Arch. d'opht.*, xix., p. 209, April.

273. MAJOWSKI. On the correction obtained with Lohnstein's hydrodiascope in cases of keratoconus and irregular astigmatism. *Klin. Monatsbl. f. Augenheilk.*, 1899, May.

274. BIRCH-HIRSCHFELD. A contribution to the knowledge of degenerative processes in corneal scars. *Graefe's Archiv*, xlviii., 2, p. 328.

275. SCHAUTE. A case of rupture of the cornea and perforation of the iris without injury of the lens. *Zeitschr. f. Augenheilk.*, i., 4, p. 374.

276. ANDOGSKY. On Kalt's corneal suture. *Wjest. Ophth.*, 1899, iii.

277. HARLAN. Abcission and combined keratectomy. *Ophth. Record*, June, 1899.

278. JENNINGS. Persistent pannus cured as a result of acute dacryocystitis. *Amer. Jour. of Ophth.*, May, 1899.

LANGIE'S (269) case of parenchymatous keratitis, in a woman aged twenty-one, recovered after the extraction of a carious wisdom tooth. Syphilis could be excluded. HERRNHEISER.

GRÓSZ (271) comes to the following conclusions :

1. The suppurative keratitis which affects the eyes of animals after section of the trigeminus, and the human eye after injury, compression, disease, or resection of the nerve, and also accompanies facial paralysis, is a single disease and is due to infection. The source of this infection is the conjunctival sac or the lachrymal sac, or there may be a direct external infection from contact.

The development of the disease is favored by the desiccation and the slight protection against trauma due to the anæsthesia.

2. The cause of true neuroparalytic keratitis in man and of keratomalacia and keratonecrosis is a degeneration of the ganglion cells in the ciliary ganglion. This is due to cachexia, local hemorrhage, or to injury.

LAGRANGE (272) regards as true neoplasms of the cornea only those that arise from the cornea proper or its epithelium. Of the former, which are described as myxoma, fibroma, or sarcoma, there is a series of old doubtful cases which Lagrange considers, as well as the newer observations which are more reliable. His own case was one of papilloma or epithelioma, occurring in a man of seventy, with a carcinoma of the lip, as a cauliflower-like tumor completely covering the cornea, but not involving the limbus or the surrounding conjunctiva. At the base of the tumor, where Bowman's membrane was destroyed, numerous vessels passed into the papillary proliferations.

V. MITTELSTÄDT.

MAJOWSKI (273) gives in tabular form the results obtained by using Lohnstein's hydrodiascope for the improvement of vision in twenty-one eyes. The instrument is made plane anteriorly instead of being + 33. D, and he has used plano-convex lenses from 20-40. D on account of the greater optical accuracy.

BIRCH-HIRSCHFELD (274) compares the statements that have been made in regard to hyalin, colloid, and amyloid, and gives the results of his study of these substances in the eye and in other organs. The colloid in corneal scars in his opinion is identical with hyalin and arises from the blood (by coagulation of a liquid), being deposited first in the corneal substance or scar and later among the epithelial cells.

SCHAUTE'S (275) patient was struck in the eye with a piece of wood, causing a small perforation of the cornea and a radial rupture of the iris with preservation of the sphincter and without injury to the deeper parts.

ANDOGSKY (276) believes Kalt's corneal suture to be the best of all those that have been recommended. He modifies it by adding a second suture. He believes, however, that a suture is indicated in exceptional cases only, when, for example, one expects prolapse of vitreous or when the wound gapes. He recommends it also in flap extraction when one wishes to preserve a round pupil. It is also of service in excising old prolapses after extraction, in removing portions of the cornea for the

correction of keratoconus and keratoglobus, in operations for corneal or scleral staphyloma, and in operations on animals.

HIRSCHMANN.

In this paper (277) HARLAN makes a plea for a return to the method of corneal abscission which was advocated by Critchett some twenty-five years ago. The stump, better than an enucleation leaves, and the comparative safety under our present antiseptic methods are advantages which cannot be ignored. Panas has also revived the operation. The reviewer has always made this operation in the case of children when possible, and particularly when an artificial eye cannot be worn for some time.

BURNETT.

In the case reported by JENNINGS (278) a trachomatous pannus which had resisted all manner of treatment, including jequirity, disappeared during an attack of dacrocystitis.

BURNETT.

Sections XIII.—XVIII. Reviewed by DR. O. BRECHT, BERLIN.

XIII.—LENS.

279. DAGILAIKY. A case of spontaneous absorption of a senile cataract. *Zehender's klin. Monatsbl.*, xxxvii., p. 218.

280. HESS. On foetal rupture of the posterior capsule of the lens and lenticonus posterior. *Zeitschr. f. Augenheilk.*, I, p. 427.

281. DALBEAU. On suture of the cornea for preventing certain accidents occurring after extraction of cataract. *Arch. f. Ophth.*, xix., 6, p. 352.

282. IGNATIEFF. On cataract extraction without iridectomy. *Wojenno med. Fourn.*, 1899, 1.

283. RANDOLPH. Diabetic cataract with a report of five operations. *Ophth. Record*, April, 1899.

284. DENIG. On the histology and etiology of posterior lenticonus. *Ibid.*

285. RAY. Some of the failures immediate and remote met with after cataract extraction. *Amer. Fourn. of Ophth.*, June, 1899, and *Annals of Ophth.*, April, 1899.

DAGILAIKY'S (279) patient was a peasant woman who gradually grew blind, and then gradually obtained vision again without any assignable cause. The eye showed no trace of injury. Behind the iris was a delicate secondary cataract and a shrunken brown

nucleus. Fundus normal. With ± 10 . D V = < 0.5 . [Absorption of the liquid of a Morgagnian cataract.—H. K.]

Hess (280) described a peculiar malformation of the lens seen in a pig's eye, which arose from a foetal rupture of the capsule; and two pigs' eyes with the nucleus of the lens lying excentrically down and out so that a lenticonus posterior was brought about. The latter malformation also is attributed by the author to a foetal rupture of the posterior capsule leading only to local changes in the fibres, as appeared from Schlösser's investigations. All three eyes contained remnants of the hyaloid artery.

DALBEAU (281) reports two cases from Trousseau's practice which show the value of corneal suture after extraction. In the first case the corneal flap became everted four days after the operation and the iris prolapsed, and here the suture led to good results. In the second case the patient, being delirious the third night after the operation, struck the eye, causing pain and hemorrhage, which were only relieved when a suture was applied two days later, at which time clots of blood and iris were removed from the wound. The threads which were passed through the conjunctiva had cut through in two days, and the hemorrhage recurred and was stopped only when another suture was passed deep into the sclera, which is always necessary in cases of severe hemorrhage. The cornea became infiltrated in the region of the wound, but a moderately atrophic eyeball was preserved.

V. MITTELSTÄDT.

RANDOLPH (283) gives the results of three cases (five eyes) of diabetic cataract on which he operated with success. The patients were, respectively, 35, 35, and 45 years old, and the combined operation was done.

BURNETT.

DENIG (284) describes and figures a lenticonus observed in the lens of a rabbit, which had at the same time a total anterior polar cataract. He divides posterior lenticonus into two forms, those with, and those without, rupture of the posterior capsule. To the former alone would be given the name of lenticonus; to the latter he thinks lentiglobus more proper. The hyaloid artery, he thinks, plays no important part in their production. The equatorial diameter of the lens was 8 mm, the sagittal 4 mm. The degenerated nucleus was surrounded by normal lens fibres, except the central posterior part where the lenticonus rested directly on the degenerated fibres.

BURNETT.

The basis of RAY'S (285) report is 141 extractions, 36 of which

were simple. Many of the operations were done under unfavorable conditions. There were 3 failures from corneal suppuration, 1 from hemorrhage from the iris, 2 from suppurative irido-choroiditis starting from a prolapsed iris, and 2 from secondary operations. These latter were not simple capsulotomies, but for closure of the pupil from inflammation. BURNETT.

XIV.—IRIS.

286. WINGENROTH. A case of diplocoria of the right eye. *Centralbl. f. pr. Augenheilk.*, xxiii., p. 105.

287. HANKE. Gumma of the iris and ciliary body. *Graefe's Archiv*, xlviii., p. 300.

288. SCHLIPP. On an epithelial tumor of the ciliary body. *Ibid.*, p. 353.

289. BRIXA. On gumma of the ciliary body and syphilitic affections of the fundus. *Ibid.*, p. 123.

290. MAYER. Hemorrhagic cyst of the ciliary body ending in spontaneous recovery. *Münch. med. Wochenschr.*, xlv, 26, p. 854.

291. HELLEBERG. A case of tumor of the iris. *Nörd. med. Archiv ny följd*, x., 3.

292. TIFFANY. Congenital irideremia. *Fourn. Amer. Med. Assoc.*, April 29, 1899.

In the right eye of a woman aged twenty, suffering from chronic choroiditis, WINGENROTH (286) found a double pupil, a smaller one above and a larger one below separated by a narrow bridge of tissue. Both were round and both reacted to light. The minor circle of the iris with the sphincter surrounded each pupil unbroken. On the anterior capsule of the lens were some fine gray deposits. No coloboma of the choroid. The author discusses the possibilities in regard to the origin of this condition and brings it into connection with the membrana capsulo-pupillaris.

HANKE (287) reports on a patient who had an initial lesion seven months before and had not been treated with mercury. There had been a pustular eruption, nodules on sternum and tibia and in the testicles, and iritis and keratitis. Two months later, a quickly growing tumor, at first red and later yellow, appeared at the sclero-corneal margin and caused so much pain that it was necessary to enucleate the eye. Later, ulcerating gummata

appeared in various parts of the body. Microscopic examination showed a subconjunctival nodule near the corneal margin which was connected with the tumor in the iris and ciliary body. A lighter and a darker central portion of the tumor could be distinguished, the former representing an inflammatory infiltration, the latter beginning necrosis. No new vessel formation was observed.

The author regards the case as unique in that, together with manifestations of early syphilis elsewhere, an iritis developed with nodules which appeared to be condylomata but microscopically would be classed as products of late syphilis.

The reviewer, however, would class the nodules on the bones and in the testicles as late manifestations and the growths in the iris and ciliary body as gummata, and the entire disease as a case of so-called galloping syphilis.

SCHLIPP (288) adds another to the six cases of epithelial tumor of the iris already reported. It was found in the right eye of a girl of ten who had become blind two years before without any cause and without pain.

The ball was sunken, the tension reduced, the cornea dull, while a yellow reflex was seen in the pupil. Enucleation in 1890 and good health since. The tumor, which filled the interior of the ball, consisted of epithelial cells arranged in some places in long tubules and connected with the epithelial cells of the ciliary body from which it would seem to have arisen. Connective-tissue was wanting and the vessels were few and small.

BRIXA (289) gives a detailed clinical and pathological description of a case of syphilitic changes in both eyes in a case of malignant syphilis, and discusses the literature of the subject.

MAYER'S (290) patient was a boy of fourteen whose right eye had been injured with a shuttle six years before. Perforating wound of the sclera, prolapse of iris, excision of latter. Gradual decrease of vision. In March, 1895, L V = $\frac{6}{8}$; R with - 3. $\frac{6}{8}$, divergent strabismus. Sclera ectatic at nasal margin of cornea, the coloboma of the iris partly filled with a dark brown opaque tumor. Lens slightly opaque and oblique in position. Vitreous and fundus normal, + T. In February, 1899, the anterior wall of the cyst was absent and there appeared only a cup displacing some of the ciliary processes. The trauma was thought to be the sole cause of the condition.

HELLEBERG'S (291) patient was a man aged forty-nine with what appeared to be a leucosarcoma of the iris and ciliary body.

The eye which was nearly blind was enucleated and the tumor proved to be localized in the iris and to have its origin apparently in the region of the sphincter muscle. This latter fact, together with the nature of the component cells—long cells with rod-like nuclei, arranged in tracts—made it appear probable that the tumor was a leiomyoma, although leucosarcoma could not be excluded absolutely.

DALÉN.

TIFFANY'S (292) case of irideremia, or rather rudimentary iris, was bilateral. $V = \frac{20}{100} -$, with $+ 2.5 \frac{20}{80}$. There were some nebulae on the cornea and in the right eye there was a string-like body attached to the posterior surface of the lens. Visual fields normal.

BURNETT.

XV.—CHOROID.

293. SILEX. Round-celled sarcoma in a phthisical eye of a child aged seven, with remarks on treatment. *Zeitschr. f. Augenheilk.*, i., p. 345.

294. SCHIECK. A further contribution to the subject of leucosarcoma of the choriocapillaris. *Graefe's Archiv*, xlviii., p. 319.

295. MELLINGER. On the treatment of choroiditis of the macula. *Ophth. Klinik*, 1899, No. 10 (polemic).

296. SARADETH. A case of puerperal metastatic panophthalmitis. *Münch. med. Wochenschr.*, 1899, ii., p. 350.

SILEX (293) reported on a case of melanotic round-celled sarcoma in the phthisical eye of a girl of seven with dense opacity of the cornea. Since an exact diagnosis could not be made and signs of sympathetic irritation had appeared in the other eye, resection of the optic nerve was done, but later the eyeball protruded and exenteration of the orbit was done, three months after which the patient died. The author warns others against doing resection of the nerve in similar cases when a precise diagnosis cannot be made.

SCHIECK'S (294) patient was a man of sixty-seven who had noticed a disturbance of vision for three months; ophthalmoscopically there was a detachment of the retina. After enucleation, a choroidal sarcoma as large as a bean was found, consisting in its central part of vessels surrounded by radially arranged oval cells without much pigment, and in its periphery of a sort of capsule consisting of pigmented spindle cells.

MELLINGER (295) states, in opposition to Darier, that in some

cases he has seen subconjunctival injections of sublimate followed by injury—severe pain, necrotic foci, adhesions between conjunctiva and sclera—but such results do not follow injections of salt solutions which act by accelerating the lymph current and are quite as efficacious as mercurial injections.

SARADETH (296) saw a case of unilateral panophthalmitis develop in the course of puerperal fever. The patient recovered except for the loss of sight.

XVI.—VITREOUS.

297. GÜNSBURG. A case in which an arterial loop passed forward into the vitreous. *Zehender's Klin. Monatsbl.*, xxxviii., p. 173.

In GÜNSBURG'S (297) case the art. nervi optici passed forward 4. D into the vitreous and then arched back to the level of the retina and divided in normal fashion. There was no trace of a hyaloid artery and the eye was otherwise normal.

XVII.—GLAUCOMA.

298. ZIEM. Severe hemorrhage after iridectomy in a patient with hemophilia. *Centralbl. f. prakt. Augenheilk.*, xxiii., p. 165.

299. RUGGI. On removal of the superior cervical ganglion for glaucoma. *Il Policlinico*, vi., 10.

300. REYNOLDS. Acute and chronic glaucoma. *Amer. Journ. of Ophth.*, May, 1899.

301. AYRES. Simple glaucoma in a girl sixteen years of age, operation iridectomy, favorable result. *Ibid.*, April, 1899.

ZIEM (298) reports on a case of hemorrhage after iridectomy for glaucoma. Both eyes were operated on at one sitting and both were lost. It was found later that the patient suffered from hemophilia. This case indicates to the author that it is worth while to follow Schweigger's advice and in cases of glaucoma to operate on the poorer eye even if it is amaurotic.

RUGGI (299) repeats Abadie's arguments in regard to the theoretical effect of excising the superior cervical ganglion in glaucoma and reports five cases in which the operation was done on each side. In two cases there was sudden disappearance of the pain and signs of irritation. In one case the pain reappeared on the following day, though it was less severe. In the fourth case there

was only temporary remission of the pain, and in the fifth only a slight diminution in tension and injection. The author recognizes that the time of observation has been too short to allow any conclusions as to the final effect of the operation.

REYNOLDS (300) holds that glaucoma is not due in any way to disturbances of either the secreting or osmotic functions of the ciliary body or iris and that it is most generally a rheumatic or gouty affection of the ciliary body. His therapeusis is in accordance with these ideas. BURNETT.

AYRES (301) reports a case of simple glaucoma in a girl of sixteen who noticed failure first in the right eye two years before. Eserine was first used with benefit, but as the fields began to contract iridectomy was resorted to, which resulted in a cure. BURNETT.

XVIII.—SYMPATHETIC OPHTHALMIA.

302. BACH. Remarks on the pathogenesis of sympathetic ophthalmia. *Zeitschr. f. Augenheilk.*, 1, p. 353.

303. TROUSSEAU. Tattooing of the cornea and sympathetic ophthalmia. *Ann. d'ocul.*, cxxi., 3, p. 185.

BACH (302) replies to Schirmer's criticisms and defines his standpoint, which coincides with that of Schmidt-Rimpler's, who believes in a modified ciliary nerve theory.

Sections XIX.—XXII. Reviewed by PROF. GREEFF, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

304. DEUTSCHMANN. Further considerations in regard to my method of treating detachment of the retina, with a report of 101 eyes thus operated upon. *Beiträge z. Augenheilk.*, 1899, p. 40.

305. LODATO. Subconjunctival injections of sodium chloride in detachment of the retina. *Arch. di Ottalm.*, iv., 1 and 2.

306. KRÜCKMANN. The pathological changes in the retinal pigment epithelial cells. *Graefe's Archiv*, xlviii., 2, p. 237.

307. WOOD, CASEY A. A contribution to the treatment of embolism of the central artery of the retina. *Ophth. Record*, June, 1899.

DEUTSCHMANN (304) reports the results of 101 cases of detachment of the retina operated on according to his method, the whole making up a volume of 226 pages. In his introduction the

author expresses his regret that the mortuary wreath has already been laid upon his operation, although he has not buried it, and has in the interval considerably developed and improved it. He formerly passed a double-edged knife as peripherically as possible from outward and downward through sclera, choroid, and retina into the vitreous, carried it somewhat obliquely through the vitreous until the opposite wall of the eyeball was reached, and then withdrew the knife, making cutting motions in each direction. Now he passes the knife through the opposite wall, perforating retina, choroid, and sclera. The conjunctiva then becomes elevated by the escape of the subretinal liquid. In this way the retina is less extensively injured and a complete evacuation of the subretinal liquid is accomplished. The knife is then withdrawn, describing a slight arch downward.

The second portion of the operation, consisting in the transplantation of rabbit's vitreous, also has been modified. The author has constructed an instrument that is both knife and canula. After a rabbit's vitreous has been removed and mixed with a sodium chloride solution, it is taken up with the knife-canula and injected into the space between the detached retina and the shrunken vitreous. The author devotes the remainder of his book to replies to the adverse criticism which has been directed against his operation by Schmidt-Rimpler, Horstmann, Intryenka, and others.

In the continuation of his paper on the anatomy and physiology of the pigment epithelial cells, KRÜCKMANN (306) takes up the pathological changes which these cells may undergo. The work is based on the fact discovered by Wagenmann, that changes in the pigment epithelium and a consecutive pigmentation of the retina occur only when the ciliary vessels are injured, and that section of the vessels of the optic nerve and retina lead to no changes in the choroid or pigment epithelium. We may always infer that circulatory disturbances exist in the choroid when pigmentation of the retina is found. Such a circulatory disturbance may be caused, for example, by endarteritis. The individual pigmented cells then suffer changes in form, in pigment contents, and in reaction to stains. The cells often become enlarged and assume unusual forms, and they may be vacuolated. The pigment granules are present only in a thin layer. Some of these cells may become restored, but most of them are cast off and lie between the retina and choroid.

An atrophy and degeneration of the retina is a necessary condition of the accumulation of pigment in the retina. Furthermore, the limitans interna must be broken through. The cast-off cells then pass into the atrophic retina.

From a study of six cases of so-called embolism of the central artery of the retina, WOOD (307) is rather inclined to be skeptical as to the value of some of the remedial agents recommended, especially massage. He is inclined to think that there may be cilio-retinal anastomoses at other localities than the disk, and that this may account for some of the cases whose sight has remained after the plugging of the central artery. BURNETT.

XX.—OPTIC NERVE.

308. AXENFELD and BUSCH. A contribution to the clinical symptomatology and histology of primary myxosarcoma of the optic nerve and on the operative removal of such tumors by Krönlein's method. *Arch. f. Augenheilk.*, xxxix., 1, p. 1.

309. ELSCHNIG. Remarks on Schnaudigel's report: A case of multiple hemorrhages of the organ of vision and the optic-nerve sheaths in particular. *Graefe's Archiv*, xlviii., 2, p. 461.

310. KIRIBUCHI. On Fuchs's peripheric atrophy of the optic nerve. *Arch. f. Augenheilk.*, xxxix., 1, p. 76.

311. GÜNSBURG. On the symptomatology and diagnosis of traumatic injuries of the optic nerve. *Wjest. Ophth.*, 1899, iii.

312. THEOBALD. A case of atrophy of the optic nerves following hemorrhage from the stomach, with a consideration of the causes of post-hemorrhagic blindness. *Amer. Journ. of Ophth.*, May, 1899.

The case which AXENFELD and BUSCH (308) reported has already been noticed in these pages, but in the present paper a table has been added showing the results of the removal of tumors of the optic nerve with preservation of the eye. Among eleven cases operated on by the older method the ball retained its normal form in only two, of the three cases operated on by Krönlein's method death occurred in one a month later from cerebral metastases, but in the other cases the eyeball was perfectly preserved.

ELSCHNIG (309) calls attention to the fact that he reported in *Graefe's Archives* (1895) two cases which supported Schnaudigel's conclusions as to the ophthalmoscopic and anatomical re-

sults of hemorrhage into the nerve sheath. He found that a considerable hemorrhage did not affect the integrity of the optic nerve and retina, or at the most caused only a slight hyperæmia of the nerve head.

KIRIBUCHI (310) finds that the portion of the optic nerve which is without fibres, lying between the pia and the peripheric septa, and concentric with the latter, is identical with the physiological neuroglia sheath of the optic nerve, which is found also about the brain and cord. It, therefore, does not represent an atrophy, as Fuchs believed. A similar neuroglia sheath is found on the surface of the larger individual bundles and about the central artery.

THEOBALD'S (312) case was a man of fifty-seven who suffered from repeated hemorrhages from the stomach. Following one of unusual severity he became "blind," and when seen more than six months afterwards the fundi presented very much the appearance of eyes which had suffered from thrombi of the retinal arteries—but associated with appearances which indicated a preceding inflammation of the optic nerve and retina. Vision limited to counting fingers very close to the eyes and over a very restricted area. The author thinks that all the appearances at the fundus after severe hemorrhages can be best accounted for by the existence of thrombus of the retinal arteries. BURNETT.

XXI.—INJURIES, FOREIGN BODIES, AND PARASITES.

313. GROENOUW. Shot injuries of the orbit with localization of the ball by means of the Roentgen rays. *Zehender's klin. Monatsbl.*, May, 1899.

314. ERB. A case of spontaneous expulsion of a piece of gun-cap from the eyeball five years after the injury. *Zeitschr. f. Augenheilk.*, vol. i.

315. NORMAN-HANSEN. When does rupture of the choroid occur after shot wounds of the temple? *Centralbl. f. Augenheilk.*, April, 1899.

316. PESCHEL. A clinical contribution to the subject of intraocular cysticercus. *Beiträge z. Augenheilk.*, xxxix., p. 68.

317. BURNETT. Removal, for persistent headache, of an ounce rifle bullet imbedded in the bones of the temporal fossa, where it had lain unsuspected for 34 years. *Journ. Amer. Med. Assoc.*, Jan. 14, 1899.

318. JAY. Foreign body in iris 32 years. *Ophth. Record*, May, 1899.

GROENOUW (313) reports on two cases of shot injury of the orbit in which he was able to localize the foreign body by means of a skiagraph. The head was illuminated through its bitemporal diameter.

ERB (314) recalls the fact that Leber showed by experiments on animals that foreign bodies of copper cause a greater reaction in the tissues than indifferent substances. The case of spontaneous extrusion of a bit of guncap from the eye of a boy of nine, five years after the injury, is therefore of interest. The small foreign body presented itself in the centre of the cornea and was easily removed.

NORMAN-HANSEN (315) comes to the following conclusions: In shot wounds of the temple choroidal rupture occurs only when the projectile strikes the eye directly. Fracture of the outer or upper wall may occur without causing rupture if the eyeball is not struck.

PESCHEL (316) reports two new cases of successful extraction of cysticercus from the eye. He concludes with geometrical considerations illustrated with twenty-one figures.

The chief point of interest in the case of BURNETT'S (317) from the oculist's point of view is the loss of sight and slow disintegration of the ball from a wound to the eyebrow by a bullet received thirty-four years ago. Apparently the eye was not touched, and the anterior part of the orbit also escaped. As the ball was found imbedded in the bones of the temporal fossa, it is assumed that there was a fracture at the optic foramen.

BURNETT.

In the case given by JAY (318) the eye had been hit by a fragment of stone or steel thirty-two years before with no injury since. Rather severe inflammation followed. There is now a grayish foreign body the size of a pin-head lying on and partly imbedded in the iris, with bands extending to the posterior surface of the cornea. No interference was allowed.

BURNETT.

XXII.—OCULAR AFFECTIONS IN GENERAL DISEASES.

319. FRAENKEL. The fundus changes in a case of pneumonia. *Graefe's Archiv*, xlviii., 2, p. 456.

320. BACH. A comprehensive description of the affections of the corpora quadrigemina and the pineal gland, with special reference to the ocular symptoms. *Zeitschr. f. Augenheilk.*, 1.

321. ZIEM. Severe secondary hemorrhage after iridectomy in a patient with hemophilia. *Centralbl. f. Augenheilk.*, June, 1899.

322. LAGLEYZE. The eye and the teeth. Pathological relations (continuation). *Arch. d'ophth.*, xix., 4-5, pp. 233 and 283.

323. BISTIS. On lepra of the eye. *Ibid.*, No. 5, p. 310.

324. PARISOTTI. The value of choked disk in the diagnosis of cerebral tumors. *Bull. d. R. Accad. Med. di Roma*, xxv., 1, 2.

FRAENKEL'S (319) patient was a man of thirty-four who had an attack of pneumonia. Very early he noticed a blurring in the sight of one eye and then, of the other, the entire field being obscured except the central portion. Fraenkel found five or six round white patches, a third of a disk diameter in width, scattered about the macula. Tuberculosis was suspected at first, but the fundus became normal again in the course of six weeks. The condition was similar to one described by Axenfeld, who regarded the patches as being due to the deposition of pneumococci in the retina.

BACH'S (320) paper consists of a critical résumé of all the reported cases of disease of the corpora quadrigemina. First he presents the cases in which the affection was restricted to the corpora quadrigemina, including tumors which had involved a portion of the corpora quadrigemina and cases in which they had been completely destroyed. Then follow the cases of tumor of the pineal gland, which involved the quadrigemina secondarily or compressed them.

The author believes that isolated destruction of the corpora quadrigemina does not cause disturbance of vision. In 31 of 66 cases there were changes in the optic nerves, usually choked disk. Symmetrical paralyses of the ocular muscles are characteristic of disease of the corpora quadrigemina.

ZIEM (321) performed iridectomy on both eyes of a man of sixty-two for inflammatory glaucoma. There was moderate hemorrhage into the anterior chamber. Two days later severe pain was felt in the night, and fresh blood appeared daily on the dressings. The eye was lost. There was also bleeding from the nose.

Since his childhood the patient had always bled profusely after any trivial injury.

LAGLEYZE (322), in the continuation of his paper, speaks of the affections of the teeth (mostly alveolar osteoperiostitis) which cause complications on the part of the eyes and orbits, and discusses the various ways of transmission. The inflammation is transmitted immediately to the eye by the periosteum or bone, or through the canals in the bone for the passage of vessels and nerves. It may also lead to disease of a sinus, causing phlegmon or phlebitis of the orbit. According to the author, the infection has not been shown in any case to have followed the lymph vessels.

The author also believes in a direct action by diffusion of toxins in the veins of the affected side of the head.

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BISTIS (323) describes the ocular changes in 27 lepra patients. In the tuberculous form the eyebrows and lids are attacked frequently and early, with loss of the lashes and ectropium or entropium. When the orbicularis muscle is affected, lagophthalmus results, as it does also in the anæsthetic form. The tarsus was never involved, nor was the conjunctiva, and the nasal duct suffered only in one case. The cornea was frequently attacked, there being pannus and nodules which grew very large and led to phthisis. There were also round, gray spots in the cornea beneath a normal epithelium. These were mostly bilateral and accompanied by a mild iritis. Primary lepra nodules in the cornea are infrequent.

The iris and ciliary body are involved usually in the form of chronic iridocyclitis. Iritis without a corneal affection is rare. Leprous tumors of the iris were not observed. The vitreous was affected frequently, the fundus rarely. Iridectomies and cataract extractions when the cataract was not complicated with iridocyclitis were successful.

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BOOK NOTICES.

(Continued from page 609.)

XXXI. **System of Diseases of the Eye by American, British, Dutch, French, German, and Spanish Authors.** Edited by WILLIAM F. NORRIS, A.M., M.D., and CHARLES A. OLIVER, A.M., M.D. Vol. IV. Motor apparatus, cornea, lens, refraction, medical ophthalmology. 8vo., pp. 949. With 51 full-page plates and 211 text illustrations. Philadelphia and London: J. B. Lippincott Company, 1900.

The general impression that one gains in first looking through this final volume is that it excels some of the preceding volumes of the system in the evenness and uniform excellence of its papers, and in the care with which the translations have been done. There is greater similarity in the treatment of the different subjects than is usual in text-books of composite authorship. The papers, without being discursive and tedious, are as complete as one could wish. Recent literature has been taken fully into account, and ancient history has been greatly curtailed or omitted. The result is a practical and readable book, and one of exceptional value.

The first and longest paper, on the "Anomalies of the Motor Apparatus of the Eyes," 166 pages, by Landolt, is an amplification of his well-known paper in the *Traité complet d'ophtalmologie*, and requires no comment. In the next paper, on "Diseases of the Cornea," 88 pages, by Nuel, the modern conceptions of the pathology of corneal diseases are clearly presented, and many of the illustrations are new and valuable. "Ametropia: its Etiology, Course, and Treatment," a paper of 80 pages by Oliver, contains many points of practical interest which are too briefly passed over in the ordinary text-books. "Diseases of the Lens" are discussed by Norris in a profusely illustrated paper of 140 pages. Many of

the photomicrographic reproductions, however, are not very convincing, and, as illustrations, are not up to the high standard of the text.

Haab, in a paper of 55 pages, treats in detail of the ocular lesions dependent upon diseases of the circulatory system; Lawford, in a paper of 40 pages, of those dependent upon disorders of the secretory and excretory organs (chiefly Bright's disease and diabetes); Story, in a paper of 15 pages, of ocular lesions in smallpox, erysipelas, diphtheria, and the like; and Santos-Fernandez, in a paper of 20 pages, of those due to influenza, malaria, yellow fever, etc. Jonathan Hutchinson, Jr., has 8 pages on eye affections due to Graves's disease and herpes zoster; and Salzmann devotes 17 pages to the entozoa of the eye.

One of the most valuable papers in the book is that by Swanzy on "Eye-diseases and Eye-symptoms in their Relation to Organic Diseases of the Brain and Spinal Cord." It is valuable because no work yet available exhibits an equal depth of research, and discrimination in the selection of material. Those who studied with profit the author's Bowman lecture on this subject, a dozen years ago, will not be disappointed in this ampler presentation. The subject of hysteria is thoroughly discussed by Parinaud in a paper of 42 pages; and simulated blindness, with equal thoroughness, by Baudry in a paper of 45 pages. De Schweinitz, in a paper of 47 pages, gives a clear account of the toxic amblyopias, slightly more condensed than his prize essay on the subject.

In a paper of 15 pages on the "Motor Changes in the Ocular Apparatus Associated with Functional Neuroses," Standish takes up the subject of the cure of chorea and epilepsy by tenotomy of the ocular muscles. Such papers are expected to strain the reader's credulity somewhat, but the author here would hardly go so far as to wish us to believe that he had cured an asthenopia arising from exophoria, by doing a graduated tenotomy of one *internal* rectus, as he states on page 785, below; and it is, therefore, only charitable to assume that in this account the type-setter has mixed things up.

The last paper is one of 12 pages by Gayet on "The Ocular Signs of Death." Although the author shows that none of the reputed ocular tests of death is uniformly certain, yet as a chapter of medical history this paper will not be found uninteresting by those who are curious of such things.

W. A. H.

XXXII. **Optics ; A Manual for Students.** By A. S. PERCIVAL, M.A., M.B., Trinity College, Cambridge. The Macmillan Co., London and New York, 1899. \$3.25.

We confess to a feeling of considerable satisfaction in taking up a text-book upon optics—even one intended for the practising ophthalmologist—which begins at the beginning, *i. e.*, with a study of the wave-theory of light. The principles of the wave-theory are by no means difficult to grasp ; they require no abstruse mathematical knowledge for their mastery ; and, once acquired, they furnish the key to all the facts of refraction and reflection, and that too in the most satisfactory manner and without the employment of anything more than the elements of mathematics. This fact, while disregarded by most writers upon elementary optics, is of considerable scientific importance. It is exceedingly well demonstrated in this work of Percival's, and, indeed, we may say that we know of no book containing a more lucid and, for the most part, simple explanation of the wave-theory and the deductions made from it.

Starting with these deductions, Percival carries the reader along in logical progress, considering in succession the subjects of reflection from plane and curved surfaces, the size of the reflected image, and the aberration of images formed by spherical surfaces ; refraction by plane surfaces including a full description of the phenomena of deviation and dispersion produced by prisms ; and refraction by spherical surfaces including a discussion of the theory of lenses, of the distance and character of their images, and of spherical and chromatic aberration ; and winds up with a very useful and instructive chapter upon the optics of the human eye, both normal and abnormal, including sections on aphakia, the determination of the refraction by the ophthalmoscope and shadow-test, on the meaning of the terms angle α , γ , and κ , and on prismospheres. The treatment of these subjects is clear and satisfactory, and, for the most part, makes no undue demands upon the reader's mathematical knowledge. Certain chapters, however, notably those upon aberration and caustics, presuppose a knowledge of the calculus ; although, it may be added, these chapters are in themselves of subsidiary importance, and they are not necessary to their context, so that they can be omitted by the student without injury.

We are glad to see that the author has made use of the theorems of Gauss in discussing the theory of lenses that have an

appreciable thickness. These principles, admirable alike for their simplicity and their universal applicability, should, in our opinion, form the very starting-point of all discussions upon lenses or refracting systems in general; and we think it a distinct mistake to do as Percival, following most authors, has here done, and consider first the laws applying to infinitely thin lenses, and then discuss as a separate proposition lenses and refracting systems of appreciable thickness. Gauss' laws are as applicable to one as to the other, and infinitely thin lenses should be regarded as only special varieties of lenses in general, and their theory as constituting only a special application of Gauss' laws. These laws, by the way, lend themselves admirably to geometrical demonstration. The determination of the cardinal points in lenses of all kinds and shapes, the principles regulating the combination of two or more lenses, and the laws governing the size, shape, and position of images, may in general be worked out from Gauss' theorems by means of simple geometrical diagrams, without having to call in the aid of any complex formulæ or of any trigonometrical calculations whatever. This fact has been repeatedly verified in teaching optics to ophthalmological students.

The book, besides its theoretical discussions, contains scattered through it numerous facts and deductions of practical value, which should commend it to the ophthalmologist as well as to the student. Not the least valuable feature is the introduction, in and at the end of each chapter, of examples and problems, the working out of which will not only confirm the student in the comprehension of what he reads, but will also illustrate to him the practical usefulness and applicability of the principles that he has been studying.

The author is to be congratulated upon having produced a compact, handy, and useful as well as full and accurate textbook.

A. D.

XXXIII. Hand-book of Optics, for Students of Ophthalmology. By WILLIAM NORWOOD SUTER, B.A., M.D., Washington, D. C. The Macmillan Co., New York, 1899. 13 x 19 c. m., pp. viii. + 209. Index. \$1.00.

This book may be presented to the student as containing that of optics which is necessary and sufficient for one about to study ophthalmology as a science and to practise it as an art. If, as the author suspects, "some of the demonstrations appear formidable," let it be remembered that they are necessary as well as

sufficient, and they have seldom been presented in a more elegant and accessible form.

This text-book, in English, brief, clear, and important, should be welcomed by both teachers and students. Now a word about the difficulties. There are not very many. An algebraic expression is not necessarily intricate because it reaches across the page. It is no disgrace to one who has been some years busy with science less formal, if not less exact, that he should hesitate a little at high-school algebra, or draw back from sines and similar functions, and as for continued fractions he may have forgotten their existence. But it is a disgrace that he should try to practise all-round ophthalmology without the mathematical and optical equipment which is here offered. By means of slipshod illustrations and imperfect analogies he may totter through an easier course and gain what he thinks is the same thing, but he will be mistaken.

An hour or two spent in review of the three topics just mentioned will have a marvellous effect in clearing away the difficulties for those who are afraid of the formulæ.

It is absolutely necessary that the student should know the dioptrics of the eye to which one spectacle lens has been added, and that he should be able to join to this system an ophthalmoscope, an ophthalmometer, or some similar instruments, without losing track of the relations that exist between object and image. This, and more, he is taught to do, by a method that will not break down under the requirements of the art.

The first part of the book is devoted entirely to geometrical optics, beginning with refraction according to Snell's law at one plane surface, then showing the changes that must take place in the pencil conditioned by circumstances of curvature and by additional surfaces. This, of course, includes the theory of the lens with its cardinal points and planes, the determination of focal lengths, and the sizes and positions of conjugate images. Chapter III. applies foregoing principles to just that combination of surfaces that is found in the human eye, and by the help of well-known constants determines its cardinal points, giving numerical results in a table. After this enough of the theory of equivalent lenses is introduced to explain the schematic eye of Listing and that of Donders. Another chapter adds one lens to this system, after which the reader is ready to consider "Errors of Refraction" and "Lenses Used as Spectacles."

Chapter VII. gives much-needed information on the subject of "The Effect of Spherical Lenses on the Size of Retinal Images." Two chapters are devoted to cylindrical glasses, alone or in combinations; one to their so-called "twisting properties," one to "tilted lenses," one to prisms, with a word or two on the distortions caused thereby. The closing chapters deal very briefly with skiascopy, the ophthalmoscope, and the ophthalmometer, perhaps not too briefly, for the student who has profited by the previous pages is quite capable of taking care of those subjects himself.

W. S. D.

Obituary.

Dr. M. BORYSICKIEWICZ, Professor of Ophthalmology at the University of Graz, Austria, died September 18, 1899, in his fifty-first year. He was formerly assistant at Stellwag's clinic in Vienna, and famous as a skilful operator. His investigations on the finer structure of the retina are well known.

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20. V. FUKALA (Vienna). Dioptrics of the ancients.
21. H. WOLFF (Berlin). Symblepharon operation.
22. M. MOHR (Buda-Pesth). Keratosis of the conjunctiva.
23. L. WEISS and W. KLINGELHÖFFER (Mannheim). Occurrence of ruptures of the iris.
24. A. BIETTI (Parma). The elastic tissues in the human eye.
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26. ABELSDORFF's translation of the Ophthalmological Section of the New York Academy of Medicine :
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27. L. WEISS and W. KLINGELHÖFFER. On the value of the Roentgen rays in ophthalmology.

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28. M. BOTWINNIK (St. Petersburg). Changes of astigmatism by physical and physiological influences.

29. L. DE WECKER (Paris). Aseptic tattooing of cornea.

30. ED. PERGENS (Brussels). Remarks on Fukala's dioptrics of the ancients.

31. S. GINSBERG (Berlin). Herpes zoster ophthalmicus.

32. L. PICK (Königsberg). Tortuositas vasorum.

33. ABELSDORFF. Translations of the original papers in the ARCH. OF OPHTH., vol. xxviii., No. 1 (G. T. STEVENS. ROSA W. STRAUS, H. DERBY).

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1. HILLEMANN (Duisberg). Ulcus corneæ rodens.

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3. SEGGER (Munich). A cured affection of the chiasm; remarks.

4. FR. FALCHI (Pavia). Congenital anomaly of bulbar conjunctiva.

5. R. GREEFF. Report on the Ninth International Ophthalmological Congress at Utrecht, first part (translation in this number, p. 661).

6. O. V. SICHERER. Report on the Ophthalmological Section at the German Association of Naturalists and Physicians in Munich, September 17-23, 1899.

7. LISTING'S Report on the Ophthalmological Section of the British Medical Association (this number, p. 644). Translated by Abelsdorff.

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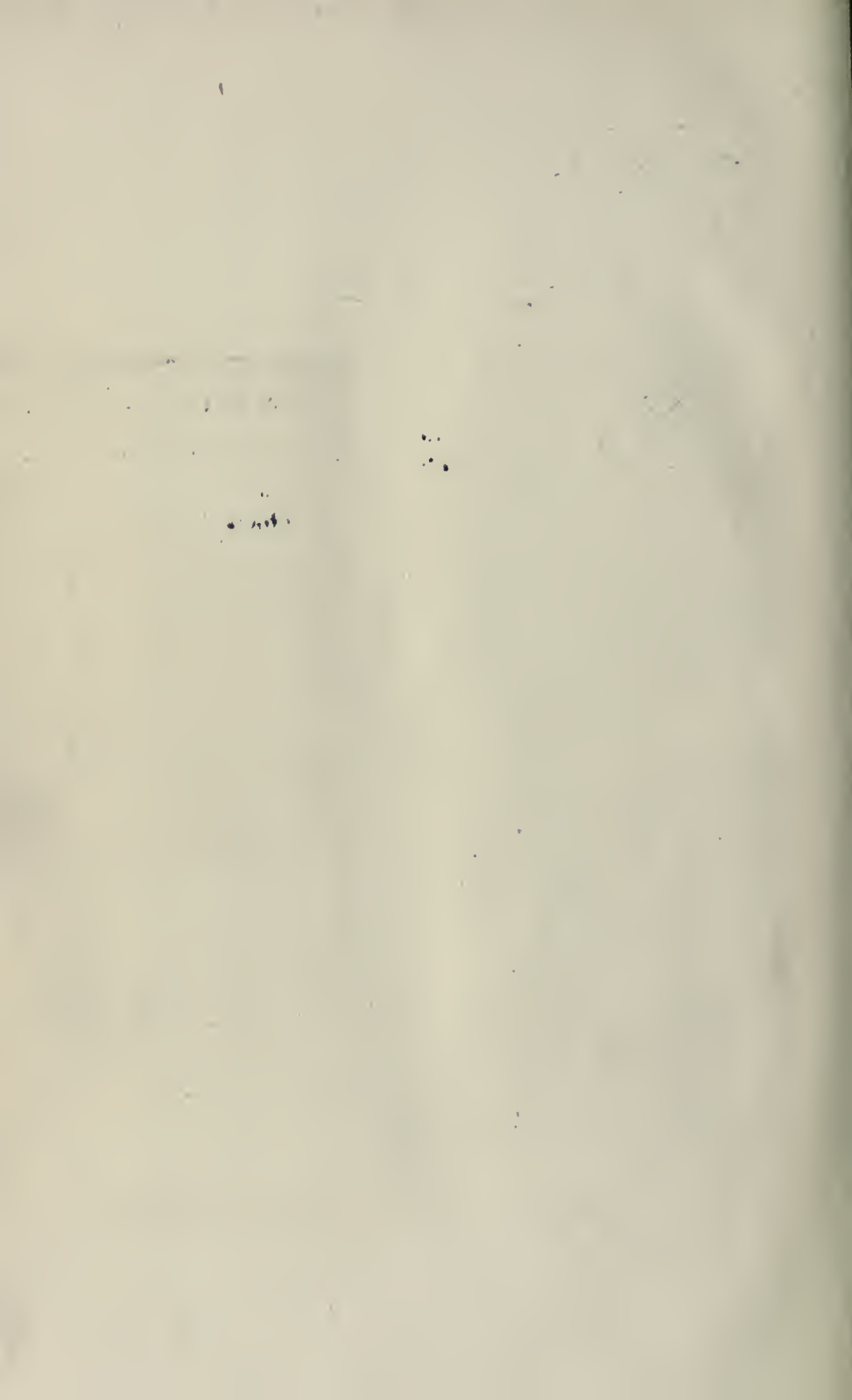
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